EXPLORING EMERGENCE IN CORPORATE SUSTAINABILITY

A Dissertation Presented

by

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DECLARATION

I, Roger Maitland, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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ABSTRACT

As the impacts of climate change intensify, businesses are increasingly committing to ambitious sustainable development goals, yet an enduring disconnect remains between corporate sustainability activities and declining global environment and society. This study adopts a complexity view that reductionism associated with Newtonian thinking has played a key role in creating many of the sustainability issues now faced by humanity. This dissertation departs from the premise that sustainability needs to be integrated into an organisation and uses a complexity view to argue that corporate sustainability is a co-evolutionary process of emergence. Whilst many studies have examined how sustainability can be integrated into a business, less is known about corporate sustainability as an emergent process. To address the knowledge gap, this research answered three questions: (1) How does sustainability emerge in financial institutions? (2) What is the role of coherence in the emergence of sustainability? and (3) What conditions enable the emergence of sustainability? A mixed method sequential design was used. In the initial quantitative strand of the research, a holistic business assessment survey based on integral theory was implemented in two financial services organisations in Southern Africa. The results were analysed using self-organising maps and explored in narrative interviews in the subsequent qualitative strand of the research. The study makes three contributions to our understanding of emergence in corporate sustainability. First, by proposing four modes by which corporate sustainability is enacted; these elucidate how integral domains are enacted in corporate sustainability. Second, by clarifying the process of emergence by articulating how zones of coherence emerge between embodied and embedded dimensions. Third, by explaining how the shift to corporate sustainability occurs by means of four conditions. These contributions serve to advance our understanding of corporate sustainability as a fundamental shift in the functioning of an organisation towards co-evolutionary self-organisation. It is recommended that corporate sustainability is holistically cultivated to support emergence and self-organisation, rather than being integrated through a linear process of change.

Keywords:

Artificial neural networks, coherence, complexity, corporate sustainability, emergence, financial services, self-organising maps, sustainability

DEDICATION

This dissertation is dedicated to the memory of Professor Mike van Oudtshoorn. You inspired me to see how learning, when well facilitated, can make a meaningful difference to the toughest challenges of humanity. As we head into one of the most precarious periods that humanity has ever faced, I hope that the ideas developed in this dissertation will, in some way, keep your vision, pragmatism and optimism alive.

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To Adam Young for music that inspired me and carried me through some of the toughest moments in this journey.

“Global warming isn’t happening to us. It’s happening *for* us. It’s a gift. Every system without feedback dies. This is feedback. It’s an offering to re-imagine who we are and what we can create with our minds, our hearts, and our brilliance.”

Paul Hawkin, Singularity University Global Summit, San Francisco, 2017.

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LIST OF ACRYONYMS AND ABBREVIATIONS

ANN	Artificial neural networks
ATM	Automated teller machine
CAQDAS	Computer-assisted qualitative data analysis software
CAS	Complex adaptive systems
CC	Corporate citizenship
CFA	Confirmatory factor analysis
CPS	Complex physical systems
CSI	Corporate social investment
CSR	Corporate social responsibility
DNA	Deoxyribonucleic acid
KMO	Kaiser Meyer-Olkin test
KPI	Key performance indicator
MLR	Robust maximum likelihood estimator
NI	Narrative interview
PCA	Principal component analysis
PhD	Doctor of Philosophy
RMSEA	Root mean squared error of approximation
SOM	Self-organising map
SDG	Sustainable development goal
SRI	Socially responsible index
VOIP	Voice-over-internet protocol
UCT	University of Cape Town
UNGC	United Nations Global Compact

CHAPTER 1: ORIENTATION

1.1 Introduction

This chapter provides an overview of the research project. Corporate sustainability is described and the importance of understanding the emergence of sustainability in financial services organisations is established. The research problem is presented, and the overall purpose of the study is discussed. The chapter also outlines the research design and structure of the dissertation.

1.2 Background to the research problem

With greater environmental, economic and social challenges that ever before, humanity faces potential catastrophe. Rising global population and declining global ecosystems, growing inequality and dwindling resources are resulting in degradation of crucial ecological systems necessary for the survival of humanity (Steffen et al., 2015; Swilling & Annecke, 2012). The potential collapse of complex societies is an increasingly plausible risk (Diamond, 2005; Steffen et al., 2015). Whilst the emphasis on corporate social responsibility and corporate sustainability in the private sector has grown, there remains a disconnect between corporate sustainability activities and the declining global environment and society (Dyllick & Muff, 2016; von Weizsaecker & Wijkman, 2017). Global fossil fuel emissions are likely to have increased by 2.7% in 2018, based on preliminary data from the first 6-9 months of the year, to the highest levels to date (Barbero et al., 2018), suggesting that more needs to be done to decarbonise the global economy.

Progress towards corporate sustainability is criticised for not being sufficiently integrated into business models (Mosher & Smith, 2015), or embedded in strategic imperatives (Valente, 2015) or culture (Bertels, Papania, & Papania, 2010). The literature has tended to focus on integration of sustainability into particular areas such as strategic management (Engert, Rauter, & Baumgartner, 2016; Lloret, 2016); management control and reporting (de Villiers, Rouse, & Kerr, 2014); performance management (George, Siti-Nabiha, Jalaludin, & Abdalla, 2014); project management (Ebbesen & Hope, 2013); and knowledge management and innovation (Lopes, Scavarda, Hofmeister, Thomé, & Vaccaro, 2017). Whilst these areas are important,

sustainability requires a fundamental change in the way an organisation functions to have a better fit between the organisation and environment (Metcalf & Benn, 2012). This requires taking a more holistic view of the organisation to understand how corporate sustainability emerges rather than examining how sustainability is integrated into, or embedded in, particular facets of the business (Baets & Oldenboom, 2009; Edwards, 2009). Adopting a complexity approach provides a holistic paradigm necessary to achieve this (Baets & Oldenboom, 2009; Chapman, 2016; Wells, 2013) This requires an increased understanding of the paths of coherence through which corporate sustainability emerges.

The purpose of the study is to better understand how organisations can address the challenges associated with sustainable development more effectively. Specifically, how corporate sustainability emerges in financial institutions, as opposed to sustainability initiatives being bolted onto the business. Exploring the role of coherence, a long-term temporal or spatial orderliness (Arecchi, 2008), facilitates a holistic understanding of the emergence of corporate sustainability.

If humanity is to achieve the Sustainable Development Goals set out in the United Nations 2030 Agenda for Sustainable Development (United Nations General Assembly, 2015), it is crucial that the private sector actively supports sustainability. Researchers have been calling for over two decades for a paradigm shift in which social and environmental domains are balanced with economic domains (Gladwin, Kennelly, & Krause, 1995; Hart, 1995; Shrivastava, 1995), yet there has been a dearth of empirical studies to enhance our understanding of how the shift in corporate sustainability takes place (Valente, 2012) – hence the importance of this study.

1.3 Research problem

This study addresses the disconnect between the declining environment and corporate sustainability initiatives (Dyllick & Muff, 2016; von Weizsaecker & Wijkman, 2017) by exploring corporate sustainability holistically (Baets & Oldenboom, 2009; Edwards, 2010) rather than as something to be added to, or integrated into, the business. This is useful as it moves beyond reductionist approaches which have tended to create a disjucture between organisations and the natural environment (Baumgartner & Rauter, 2017; Shrivastava, 1995). This research seeks

to address this disjuncture by exploring how corporate sustainability emerges in financial services institutions.

A complexity approach allows for an investigation into how organisations design a better fit with their environments (Metcalf & Benn, 2012), considering how coherence develops and the role that this plays in the emergence of corporate sustainability. This will enrich the understanding of the emergence of corporate sustainability as a holistic, self-organised and co-evolutionary process.

1.4 Research questions

The following questions are answered by this research:

1. How does sustainability emerge in financial institutions?
2. What is the role of coherence in the emergence of sustainability?
3. What conditions enable the emergence of sustainability?

1.5 Research objectives

The research addresses the following objectives:

1. To understand the process of emergence of sustainability in financial institutions.
2. To describe the role of coherence in enabling the emergence of sustainability.
3. To design a framework for the development of conditions that enable the emergence of sustainability.

1.6 Research design

This exploratory case study used a mixed method explanatory sequential design (Creswell, 2015). Two financial institutions operating in Southern Africa that were actively addressing sustainability initiatives, were identified. A case study research strategy was used to explore corporate sustainability in its real-world context when boundaries between the phenomenon and context are unclear (Yin, 2014). Corporate sustainability is associated with a wide set of variables and open system boundaries (Chu, Strand, & Fjelland, 2003).

The Cassandra Survey, a holistic organisational measure (Baets & Oldenboom, 2013), was used in the initial quantitative strand of the research. An artificial neural network analysis was conducted using self-organising maps to organise the data into clusters (Kohonen, 1997). The subsequent qualitative strand used narrative interviews to explain the quantitative results (Creswell & Plano Clark, 2010). A narrative approach to the qualitative data analysis prioritises the holistic and emergent properties of the data (Bakhtin, 1986). The interview data were explored to develop a framework that explained the quantitative data.

1.7 Assumptions

These are the key assumptions of the research:

- Sustainability is currently emerging in the financial institutions being studied. There are sufficient sustainability challenges in the financial services sector in Namibia, Botswana and Zambia to make corporate sustainability relevant to organisations in this sector.
- The organisations involved are already engaging in sustainability initiatives and these initiatives are sufficiently diverse and developed to be worth investigating.
- The middle, senior and executive managements of the organisations have sufficient understanding of sustainability and knowledge of the organisation to have an informed perspective of the integration of sustainability into their organisations.
- Sustainability is a real, pressing and complex problem that requires integration into all aspects of organisational practices.

1.8 Delimitation and scope of study

The parameters of the research were determined by the following criteria:

- Listed banking institutions operating in Namibia were approached to be included in the research. With the embedded case, the data collection extended into the subsidiaries in Botswana (quantitative and qualitative) and Zambia (quantitative only).
- Due to the complexity of the instrument and necessary access to organisational information, data were only collected from middle, senior and executive management, and more junior employees were excluded.

- Although it is acknowledged that the organisations included are embedded in containing systems and that these systems play a crucial role in the transition to sustainable futures, the study focused on the emergence of sustainability in each financial institution.
- The limitations of case study research must be acknowledged. Whilst case study findings should not be generalised to a wider population, they can be generalised to theory (Scapens, 1992; Yin, 2014).

1.9 Contribution of the study

This research responds to the call for a paradigm shift in which economic domains are balanced with social and environmental domains (Gladwin et al., 1995; Hart, 1995; Shrivastava, 1995) by seeking to enrich our understanding of how the shift to sustainability takes place (Valente, 2012). The metaphor of cultivation is introduced as a means of understanding how to support corporate sustainability as an emergent process. This provides a more holistic way of conceptualising sustainability initiatives and goes beyond more mechanistic notions such as integration and linear change processes.

This research contributes to corporate sustainability literature by enriching our understanding of how sustainability emerges; it determines four modes by which corporate sustainability is enacted. The research provides a robust conceptualisation of how zones of coherence develop between different levels of the system by recognising four embedded and four embodied dimensions of coherence. Four conditions are identified which enable corporate sustainability to be enacted. The existing corporate sustainability literature is thus enhanced by providing a holistic view of corporate sustainability which is crucial in conceptualising how organisations can create a better functional fit with their natural environment (Metcalf & Benn, 2012).

The resultant emergent corporate sustainability framework will be practically useful to managers, sustainability practitioners and coaches seeking to support the implementation of corporate sustainability initiatives in a more holistic manner. It will help to more precisely determine how to create conditions to encourage corporate sustainability initiatives. The study thus provides a means whereby complexity approaches can be further researched and implemented in corporate sustainability initiatives.

1.10 Structure of the dissertation

The dissertation is structured as follows. Chapter two positions the research in the broader global polycrisis of sustainability, and makes the case for a complexity approach. It then recognises four waves in the corporate sustainability literature and proposes an emergent corporate sustainability framework. Chapter three situates the study of emergence in a complexity paradigm, teasing out the implications of sustainability as a phenomenon being ontologically and epistemologically plural. It then presents the research design, data collection, data analysis and quality assurance for both quantitative and qualitative strands of the research. Chapters four and five contain the quantitative and qualitative findings for Cases A and B and provide a synthesis of the quantitative and qualitative data. Chapter six comprises a mixed method cross-case analysis and the proposed emergent corporate sustainability framework. In chapter seven the contribution of the study is articulated and the implications for future research and practice are discussed.

1.11 Conclusion

This chapter provided an orientation to the research, outlining the purpose and contribution of the research in relation to the literature as well as challenges presented by the integration of sustainability into financial institutions. The research problem was contextualised and articulated. An overview of the research design was provided, and the limitations were explained. The structure of the thesis was outlined. The next chapter reviews key theory and research in the sustainability literature.

CHAPTER 2: THEORETICAL BACKGROUND

2.1 Introduction

This chapter provides a theoretical background to the study, focusing initially on why complex thinking is important in addressing the sustainability global polycrisis, which presents an increasingly complex and uncertain business context. The intention is to situate the constructs of the study and to expound a complexity approach to corporate sustainability. integral theory will be introduced as a useful way to conceptualise a firm in a more holistic manner so as to enhance the fit between the firm and its natural environment.

The development of the corporate sustainability literature will then be explored and shown to progress through four waves, namely normative, instrumentalist, systemic and emergent.

The literature on emergence will be reviewed and the construct of coherence introduced as a means of supporting organisations to address the complexity and challenges associated with the transition to a more sustainable future. Finally, a conceptual framework is presented that summarises key relationships between the constructs of emergence, coherence and corporate sustainability.

2.2 The global polycrisis

This section will discuss the global polycrisis that corporate sustainability seeks to address, highlighting the transdisciplinary nature of this crisis, which brings the complexity of the transition to a sustainable future into focus.

Expounding corporate sustainability necessitates an examination of the changing context in which businesses operate, and the effects of human activities on the natural and social environments in which we are embedded. The narrow focus on shareholder value has resulted in corporations seeking short-term gain (Bansal & DesJardine, 2014) at the expense of the systems in which they are embedded. Corporations are increasingly criticised for no longer being fit-for-purpose, having unsustainable business philosophies and roles in society (Gladwin et al., 1995; Shrivastava, 1994, 1995); despite being “designed to facilitate economic development, the corporate form now threatens human survival” (Metcalf & Benn, 2012, p.

195). This global polycrisis will now be explored as the wider transdisciplinary context of corporate sustainability.

Until recently, the activities of humankind have had a marginal impact on the dynamics of earth systems, which historically were regional at most. An exponential increase in global population coupled with the burning of fossil fuel for energy since the industrial revolution, has given rise to a new geological age, the Anthropocene - proposed by Nobel laureate Paul Crutzen (McNeill & Engelke, 2014). The use of fossil fuel energy enabled humans to drive earth systems "well outside of (their) normal operating range" (Steffen et al., 2004, p. 81). There has been general agreement for some time that "we live in the Anthropocene, a human-dominated geological time unit" (Lewis & Maslin, 2015, p. 145). The Anthropocene was only officially recognised by the International Geological Congress in Cape Town in August 2016.

The unusually stable climatic conditions of the Holocene, beginning at the end of the last glacial period (8000 BC), allowed for the development of agriculture and civilisation. However, since around 1945 localised impacts have created a situation in which human action has become the key factor governing essential biogeochemical cycles such as the carbon and nitrogen cycles (McNeill & Engelke, 2014). Key to understanding the interaction between human societies and environmental change is the conceptualisation of the earth as a "single system within which the biosphere is an active, essential component" (Steffen et al., 2004, p. 1). The theory of the earth as a self-regulating complex system was first proposed as the Gaia hypothesis (Lovelock & Margulis, 1974), thereby emphasising the importance of adopting a holistic perspective in addressing sustainability issues.

Figure 2.1 displays the multiplicity of indicators of socio-economic development, which have been globally aggregated (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015). The exponential rise in the graphs mostly accelerate post-1945.

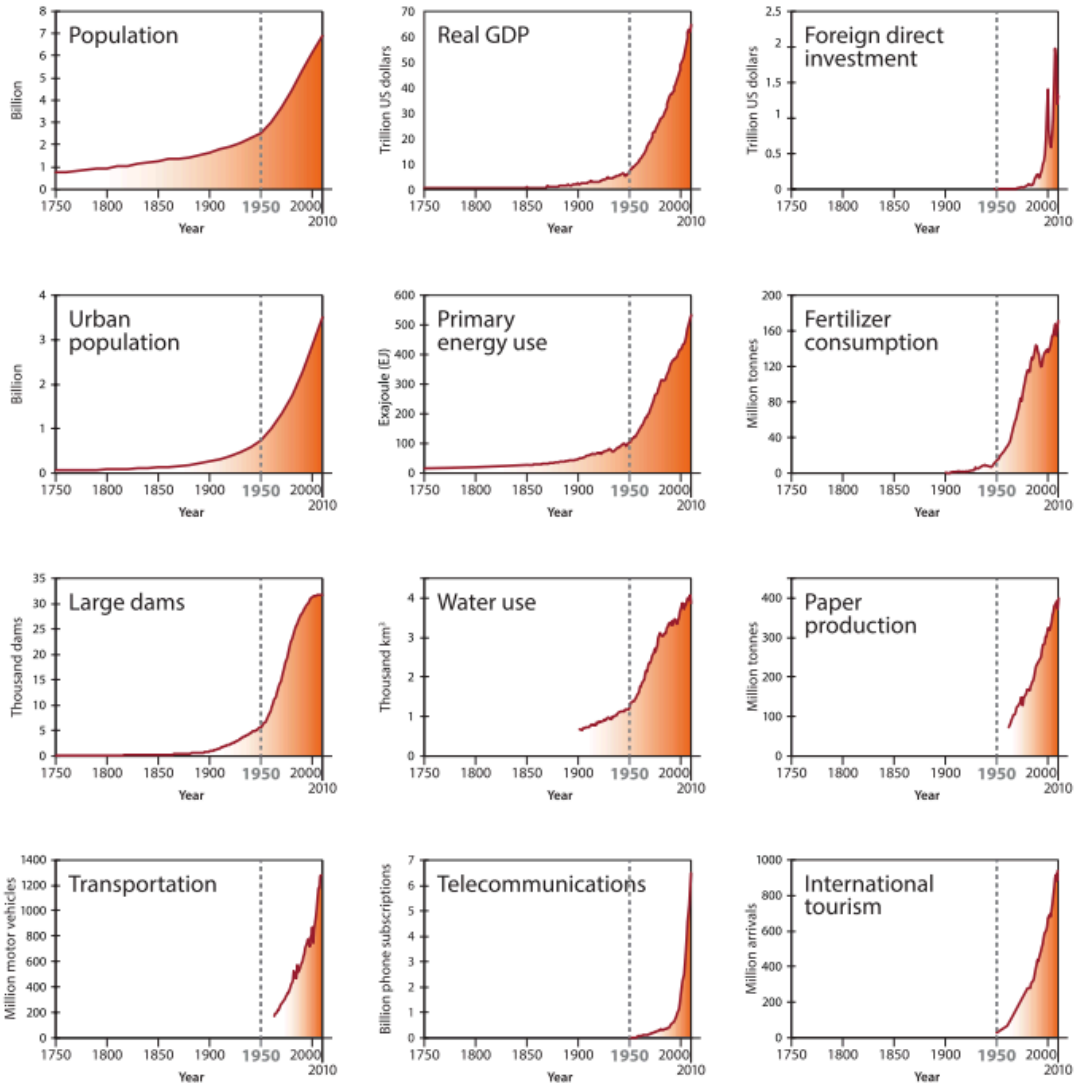

Figure 2.1: Socio-economic trends

Source: Reprinted from Steffen et al. (2015, p. 84)

The crisis of overconsumption is highlighted by what has been termed the great acceleration (Steffen et al., 2015). Prominent scientists have been raising the alarm since the 1970s when Meadows published the “Limits to Growth” for the Club of Rome (Meadows, Meadows, Randers, & Behrens, 1972). This great acceleration is unlikely, however, to last long due to natural limits being reached (McNeill & Engelke, 2014).

The great acceleration has resulted in devastating consequences for earth systems. The earth is now in the sixth mass extinction period in history (Kolbert, 2014), with the cumulative effects

of an exponential increase in world population; growing climate instability (Swilling & Annecke, 2012); degradation of 60% of the world's ecosystem services (Millenium Ecosystem Assessment, 2005) and almost half of top soils; and 90% of fishing stocks being over- or fully fished (von Weizsaecker & Wijkman, 2017). Most recently, scientists have cautioned that the carbon budget imbalance[1] continues to increase, as total emissions are projected to grow by 2.7% in 2018, with industrial emissions of carbon dioxide hitting a record high of 37.1 billion tonnes this year (Barbero et al., 2018). Human impact on earth systems is extensive. Figure 2.2 displays indicators of the functioning and structure of the earth system (Steffen et al., 2015).

The magnitude of socio-economic and earth system trends has resulted in what has become known as super-wicked problems. Wicked problems involve multiple interacting systems, are characterised by uncertainties which occur at social and institutional levels and have no definitive formulation (Mertens, 2015). Wicked problems are symptoms of other problems, and this interconnection means that solutions are partial and better or worse, rather than right or wrong (Rittel & Webber, 1973).

The concept of "super-wicked" was introduced to "characterise a new class of global environmental problem" (Levin, Cashore, Bernstein, & Auld, 2012, p. 124). Super-wicked problems can be distinguished from wicked problems by the following characteristics: (i) absence of central authority, (ii) time is running out, (iii) people trying to resolve the problem are also contributing to causing it, and (iv) policies addressing the problem discount the future in an irrational manner (Levin et al., 2012).

[1] The carbon budget imbalance is the "difference between the estimated total emissions and the estimated changes in the atmosphere, ocean, and terrestrial biosphere" (Barbero et al., 2018, p. 2143).

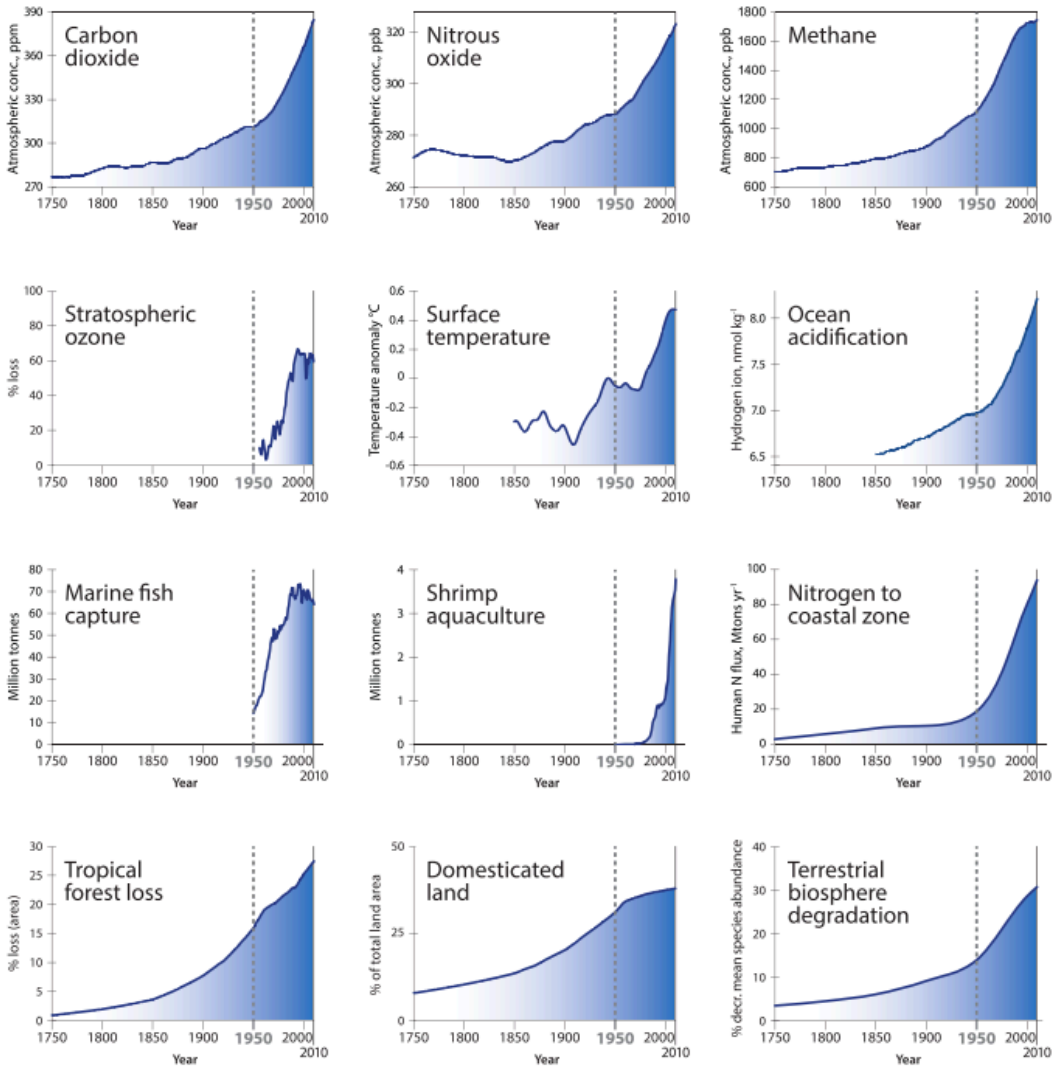

Figure 2.2: Earth system trends

Source: Reprinted from Steffen et al. (2015, p. 87)

Seen from this perspective, the polycrisis as a super-wicked problem is both complex and transdisciplinary in nature (Wells, 2013), emphasising the importance of complex thinking in sustainable development and corporate sustainability, which was eloquently expressed by the recipients of the Blue Planet Prize:

> "The ability to do has vastly outstripped the ability to understand. As a result, civilisation is faced with a perfect storm of problems, driven by overpopulation, overconsumption by the rich, the use of environmentally malign technologies and gross inequalities…The rapidly deteriorating biosphere is more than bad enough, but it is barely recognised by

a global society infected by the irrational belief that physical economies can grow forever" (Brundtland et al., 2012, p. 3).

2.3 The transition to a sustainable future

This section defines sustainable development and discusses the sustainable development goals. The achievement of these goals is challenged by global long-term risks associated with a range of global megatrends. The transition to a sustainable future is fraught with entanglements and trade-offs between various sustainability goals; it will be explored to contextualise corporate sustainability and highlight the importance of a complexity approach.

The move towards a sustainable future represents possibly the greatest challenge of our generation. Almost four decades ago Lester Brown, founder of the EarthWatch Institute, introduced the notion of a sustainable society as one that is able to satisfy its own needs without compromising the chances of future generations (Brown, 1981), and the call is now intensifying for "mobilising to save civilisation" (Brown, 2009, p. 261).

Sustainable development was defined by the World Commission on Environment and Development in the Brundtland Report (1987, p. 63) as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Whilst the definition is highly contested, the report provided an important foundation for sustainable development (Swilling & Annecke, 2012). The report highlighted the important role of inequality and environment (Langhelle, 1999), whilst Swilling and Annecke (2012) suggest that it is necessary to accept the need for absolute limits to the ability of the biosphere to absorb emissions from human activities which must not be breached.

A unanimous agreement, the 2030 Agenda, was adopted by the United Nations in 2015; it comprised 17 sustainable development goals (SDGs), which are displayed in Figure 2.3. Goals 1-11 are socio-economic, goal 12 relates to responsible consumption and production, and goals 13-15 are environmental. All goals are specified using targets and indicators.

Figure 2.3: The 17 Sustainable Development Goals of the 2030 Agenda

Source: Reprinted from United Nations (2018)

Whilst the SDGs provide a valuable target for sustainable development, the Club of Rome has questioned potential issues with trade-offs between the goals:

> "Nowhere, however, is it admitted in the Agenda 2030 that the successes in reaching the eleven social and economic goals (Goals 1-11), if done based on conventional growth policies, would make it virtually impossible even to reduce the speed of global warming, to stop overfishing in the oceans or to stop land degradation, let alone halt the loss of biodiversity. In other words, assuming no major changes in the way economic growth is defined and pursued, humanity would be confronted with massive trade-offs between the socio-economic and the environmental SDGs" (von Weizsaecker & Wijkman, 2017, p. 39).

The complexity of sustainability highlights the need for a multiplicity of situated approaches rather than aiming for an idealistic end state. Seen in this way, sustainability is a conversation of values (Blewitt, 2008) or the application of situated dimensions alongside science-based decision making (Frank, 2017). Many of the challenges associated with climate change and

sustainable development are accentuated by the transdisciplinary nature of this transition. “Vulnerability to the specific impacts of climate change will be most severe when and where they are felt together with other stresses from other sources” (Yohe et al., 2007, p. 813). It is therefore important to look at the inter-linkages between the economic, ecological and societal factors identified in the Brundtland definition (Baets & Oldenboom, 2009; Martin, 2008; Swilling & Annecke, 2012).

Companies operate in an increasingly complex environment in which global megatrends such as climate change, environmental degradation and rising income inequality have resulted in significant global long-term risks (World Economic Forum, 2018). These are experienced by firms and society as super-wicked problems (Levin et al., 2012). A high degree of complexity in these problem contexts can be seen in Figure 2.4 in the interconnection between risks, resulting in cascading negative impacts for firms and society (World Economic Forum, 2018). This figure shows the transdisciplinary nature of sustainability, and also highlights contextuality in complex systems. Contextuality occurs when element(s) are shared between more than one system, making control and prediction difficult (Chu et al., 2003). Figure 2.4 provides several interconnected examples of contextuality which pose potential risks for financial services organisations.

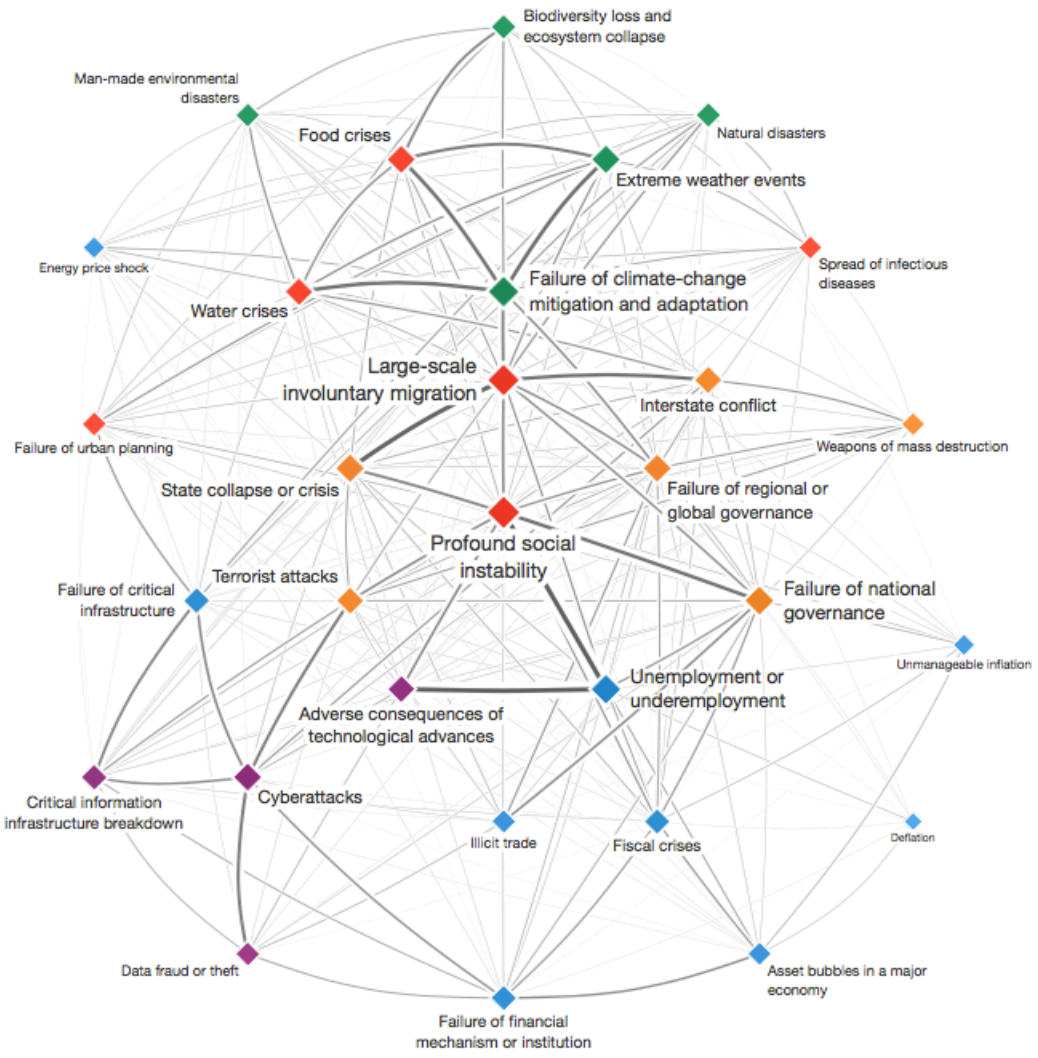

Figure 2.4: The Risks-Trends Interconnections Map 2018

Source: Reprinted from World Economic Forum (2018, p. 5)

Financial services organisations face multiple interconnected risks, some of which can be seen in Figure 2.5 to be associated with the possible failure of financial mechanisms or institutions. Whilst these risks are likely to constitute a strategic focus in financial services institutions, the broader interconnections with environmental and social risks are less obvious and demonstrate the transdisciplinary nature of sustainability as a super-wicked problem.

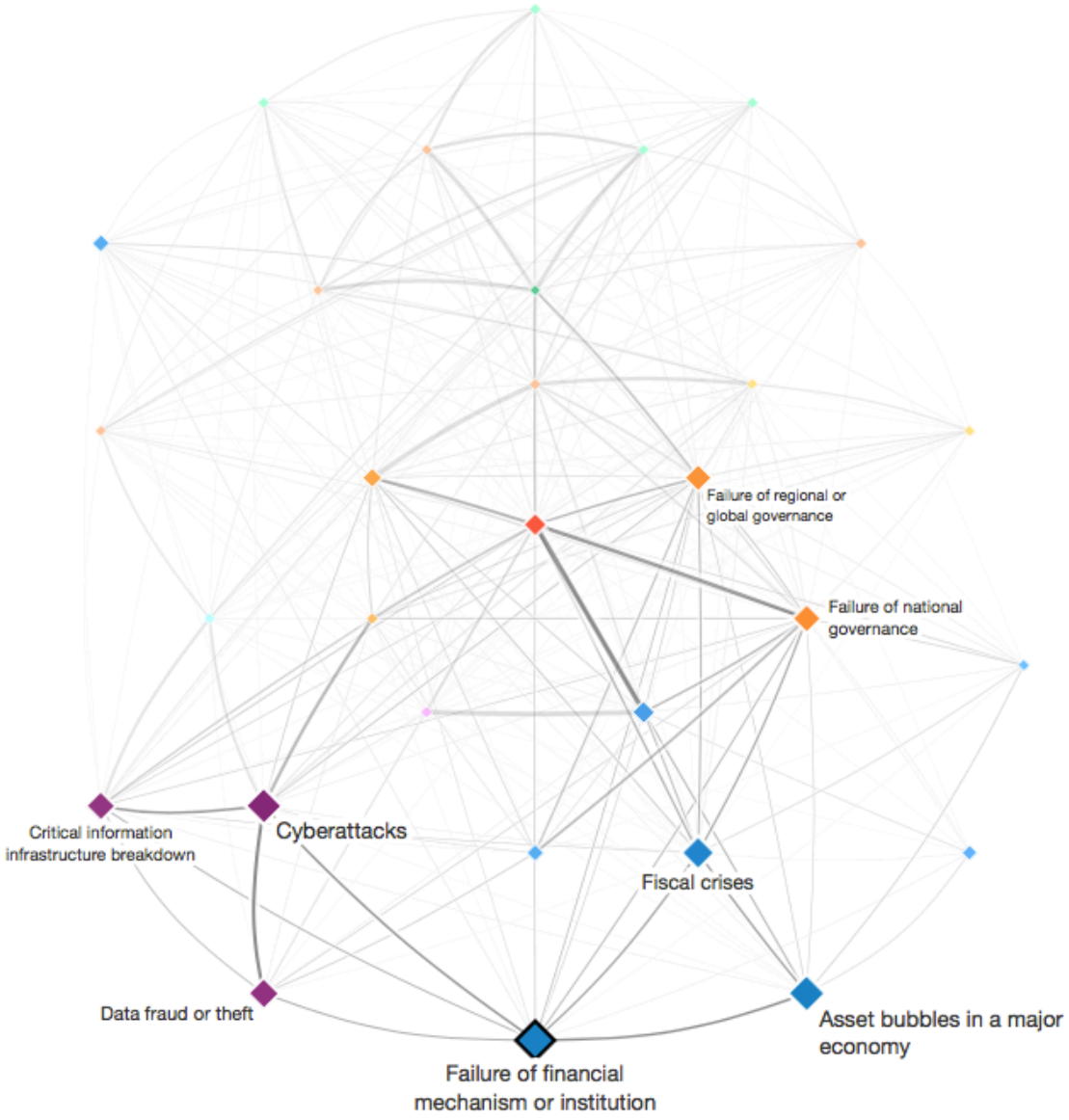

Figure 2.5: The Risks-Trends Interconnections Map 2018: Financial risks-trends

Source: Reprinted from World Economic Forum (2018, p. 5)

2.4 Need for a complexity approach

This section explores the importance of a complexity approach to corporate sustainability. Complex systems are discussed, and firms are conceptualised as complex adaptive systems which interact dynamically with economic, environmental and social systems. The study holds that the challenges associated with corporate sustainability require firms to interact with a wider set of variables, thereby radically increasing the openness of system boundaries. This makes a complexity approach important in corporate sustainability.

The reductionist aftermath of modernism in which science sought to explain reality in the simplest terms possible, has resulted in what Morin (2008) describes as “blind intelligence”. “The deep cause of error is not error of fact (or false perception), or error of logic (incoherence), but rather the way in which we organise our knowledge into a system of ideas (theories, ideologies)” (Morin, 2008, p. 2). This deterioration in reasoning ability points to the need for complex thought.

Complexity theory emerged from systems theory, in an attempt to explain systems which have a multiplicity of potentials that can be actualised (Cilliers, 1998) through complex inter-relationships and interdependencies (Mittleton-Kelly, 2003). Complexity thinking counters universal determinism, reductionism and disjunction that led to the separation of disciplines in classical science (Wells, 2013), and thus forms a useful approach for corporate sustainability.

The global polycrisis can be seen to result from the inability of humanity to deal with the complexity of ecological and social interactions at local, regional and global levels (Espinosa & Walker, 2011). The transdisciplinary nature of this endeavour in which the relationship between physical and anthropo-social knowledge is recursive (Morin, 1992) highlights the need to “integrate plural epistemologies and methods, to a general perspective on reality” (Wells, 2013).

This has important implications for management theory and practice which have tended to create a disjuncture between the existence of firms and the natural environment (Baumgartner & Rauter, 2017; Shrivastava, 1995). Addressing this is not only a transdisciplinary problem (Wells, 2013) of the organisation adapting to the embedded system (Metcalf & Benn, 2012), but also a co-evolutionary process in which adaptation to the environment occurs alongside the

process of influencing the environment whilst actively responding to dynamics (Mitleton-Kelly, 2011).

2.4.1 Complex systems

Environmental phenomena are embedded in complex systems, and thus represent messy and context-rich situations which complicate decision making for corporate sustainability (Seager, Collier, Linkov, & Lambert, 2013). Complexity theory has had an enduring influence on management and organisational theory (Pollack, Alder, & Sankaran, 2014); this has implications for corporate sustainability.

Complex systems consist of a large number of diverse components that interact in a rich and non-linear manner (Cilliers, 1998). Complex systems are non-reductive in that they cannot be reduced to constituent elements due to the combined effects of these interactions (Espinosa & Porter, 2011). Direct and indirect feedback loops act simultaneously, amplifying or inhibiting behaviour in a system (Cavanagh, 2006) and creating non-linear effects which are difficult to predict (Cilliers, 1998). Complex systems are open in that they exchange information and energy with surrounding systems, and this throughput of energy means that a system operates in dynamic equilibrium (Cilliers, 1998). System memory is distributed across the system, allowing the system to influence its future and self-organise (Espinosa & Porter, 2011), enabling it to be inherently adaptive (Cilliers, 1998). These processes result in emergence, or novel patterns, structures and properties, in which higher-level order emerges from lower-level processes (Espinosa & Porter, 2011). Thus “complexity starts when causality breaks down” (Crutchfield & Young, 1989, p. 105), and the causality can be seen as networked rather than singular and linear (Richardson, 2008).

Complex systems are a type of system which can be approached from a natural or formalised system perspective. A natural system is identified as a “set of phenomena that shares some common aspect one is interested in” (Chu et al., 2003, p. 22). This is the pragmatic and fuzzy approach to identifying systems. A formalised system perspective involves formalising a system into a workable model, which requires the reduction in number of elements having been prioritised to work with. This can be considered the idealised system (Chu et al., 2003). The modelling of systems requires the systems to be idealised (impoverished) and artificially

separated from the ambience such that they can be modelled. In this state the system is "almost closed". A natural system is open as it is embedded in a context.

2.4.2 Firm as complex adaptive system

A firm can be conceptualised as a complex adaptive system (Baets, 2006; Holland, 2014; Stacey, 2010), which provides a useful lens for corporate sustainability. The theory of complex adaptive systems can help firms cope with uncertainty.

Swilling and Annecke (2012, p. 4) propose that "a theory of complex adaptive systems helps to create the basis for the kind of sustainability science that can cope with uncertainty without obliterating hope". Complex adaptive systems, developed through research on ecological systems, are open systems made up of parts which are whole systems, which operate in accordance with their own intentions and rules and adapt to each other. It is this interaction which over time results in order in the overall system (Cavanagh, 2006). The complexity associated with systems within systems creates the capacity for these systems to adapt.

Complex systems can be divided into two types of systems, namely complex physical systems (CPS) and complex adaptive systems (CAS). Whilst CPS have fixed elements, the elements in CAS are agents that learn or adapt through interactions with other agents. This means that the elements change as the agents adapt (Holland, 2014). Information is exchanged across permeable boundaries in CAS (Espinosa & Porter, 2011). Control of a CAS is decentralised: coherent functioning of the system results from dispersed decision making by agents (Waldrop, 1992). Viewing a firm as a CAS broadens the focus from top-down hierarchical approaches to include a simultaneous focus on emergence:

> "It is unusual for CAS agents to converge, even momentarily, to a single 'optimal' strategy, or to an equilibrium. As the agents adapt to each other, new agents with new strategies usually emerge. Then new agents offer opportunities for further interactions, increasing the overall complexity" (Holland, 2014).

Seen in this way, a firm as a CAS is embedded in economic, environmental and social systems and has the potential to recognise and utilise its agent status in a wider and complex range of interconnected and dynamic systems (Metcalf & Benn, 2012). Many of the challenges pertaining to sustainable development require systems to interact with a wider set of variables

outside of the system boundaries, thereby radically increasing the openness of systems (Chu et al., 2003). This increases the unpredictability of the system but also the potential to leverage emergence.

The radical openness implies that the extent of the embeddedness of the system has widened, and thus a broader range of interactions can occur. This can be seen in Figure 2.6, where the system on the right composed of interacting elements is embedded in the containing system in the middle. Whilst not all the elements will influence the system, the interaction of some elements may open the system up even further, as is seen on the left. In the context of globalised markets or challenges associated with sustainable development, this wider set of influences is a critical consideration.

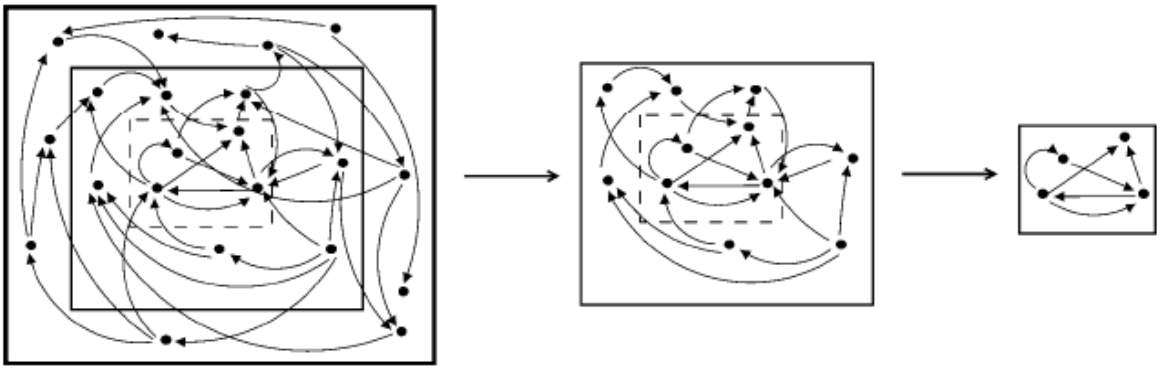

Figure 2.6: Radical openness in systems

Source: Chu et al. (2003, p. 24)

This process of co-evolution of the firm and its wider containing system transitions through equilibrium points, self-organisation and environmental adaptation, where order is emergent rather than achieved through hierarchical control (Dooley, 1997; Waldrop, 1992). A complexity approach is optimistic in that “All well-studied CAS exhibit lever points, points at which a small directed action causes large predictable changes in aggregate behaviour” (Holland, 2014). Whilst complexity theory has been applied to organisational management, Richardson (2008) suggests that managers focus on complexity as a philosophy to make limits to knowledge and underlying assumptions explicit, rather than using it as a tool to enhance prediction and control (Stacey, 2010).

Addressing this radical openness of systems in sustainability requires the application of complexity principles beyond a single complex adaptive system to consider how the principles apply to social and environmental phenomena - that is, considering the firm in the context of its containing systems. This broader focus associated with corporate sustainability and sustainable development requires that we draw from a plurality of approaches to sustainability. “Embracing pluralism provides a way out of the ideological and epistemological straightjackets that deter more cohesive and politically effective interpretations of sustainability” (Sneddon, Howarth, & Norgaard, 2006, p. 253).

The application of complexity science to sustainability offers a valuable way of working in complexity. Wells (2013) developed a useful complexity and sustainability framework (Table 2.1) which applies the widely accepted complexity principles of non-linearity, networks, hierarchy, feedback, emergence and self-organisation (Cilliers, 1998; Morin, 2008b; Richardson, Cilliers, & Lissack, 2001; Woermann, 2010) to social and environmental sustainability.

Complexity principles I: Complex dynamic systems	**Complexity Principles II: General for many issues including sustainability**	**Complexity Principles III: Particularly for social and environmental sustainability**
Non-linearity	Rate, unpredictability, rapid change, surprise, thresholds, tipping points	Irreversibility, non-renewability, cradle to grave, accounting, long-term thinking
Feedbacks	Dynamic processes, uncertainty, unknowability, degrees of risk, probability	Social and environmental thresholds, tipping points, rapid change, and abrupt change
Networks	Network causality, networked consequences, coevolution, coproduction, unintended consequences, counter productivity, interactions, interdependence	Environmental and social interdependence, myriad coevolving social and environmental crises, full systems accounting, synergistic approaches

Hierarchy	Observers, contexts, disciplinarity, interdisciplinarity and transdisciplinarity, system boundaries, degrees of openness/closure, scale, grain	Physical, environmental and social contexts, levels, and transdisciplinarity
Emergence	Complexification, coherence, novelty, codes, constraints, evolution, species differentiation, human individuation, identity, autonomy, culture, meaning	Human learning, adaptation, strategy, and change, e.g. changes in human impact on societies and environments
Self-organisation	Life, reproduction, dynamic equilibrium, vulnerability, subjects, subjectivities, identity, autonomy, creativity, vision, epistemological and methodological pluralism of both quantitative and qualitative, reductionism, constructivism and narratives, precaution, pro-action, crisis, opportunity, wisdom	Collapse, resilience, and sustainability in social and environmental systems, limits to growth, de-growth, and regrowth, limits to natural resource depletion, and learning and self-organisation for changes in ideas, policies, lifestyles, worldview, and current and future societal visions

Table 2.1: Complexity and sustainability framework

Source: Reprinted from Wells (2013, p. 48)

Whilst this study focuses on emergence, “nonlinearity, feedbacks, networks, and hierarchy, are in turn central principles for understanding the processes of self-organisation and emergence” (Wells, 2013). Emergence will be unpacked in greater detail with reference to corporate sustainability later in the chapter.

Complexity science offers a means of dealing with the complexity inherent in the wicked problems associated with sustainable development and corporate sustainability. The development of corporate sustainability literature, encompassing key waves of development leading up to a complexity orientation, will now be explored.

2.5 Corporate sustainability

Thus far, the global polycrisis and complexity associated with transitioning to a more sustainable future have been considered. Complex systems have been defined and the notion of radically open system boundaries as crucial to understanding the dynamic interaction between an organisation as a complex adaptive system and its environment has been examined. The extent to which this complexity inherent in the broader field of sustainable development is addressed in corporate sustainability literature will now be examined.

In this section, the emergence of corporate sustainability will be explored, from early roots in philanthropy to the rise of corporate social responsibility and corporate citizenship. More recent calls for the integration and embedding of sustainability with a focus on triple bottom line will be critiqued, and a complexity approach is proposed in which coherence is developed between the embedding and embodiment of corporate sustainability. The purpose of this review is to look at big picture trends in the emergence of corporate sustainability and examine underpinning theories and paradigms.

Whilst there is a wide range of definitions of corporate sustainability, with some theorists emphasising the ecological sustainability dimension (Sharma & Henriques, 2005; Shrivastava, 1995), this study includes social and environmental considerations alongside financial ones (Bansal, 2005; Gladwin et al., 1995; Valente, 2015). Viewed from this perspective, corporate sustainability can thus be defined as “the inclusion of social and environmental concerns in business operations and interactions with stakeholders” (van Marrewijk & Werre, 2003, p. 107). Wilson (2003) considers corporate sustainability to be a new management paradigm extending beyond the traditional growth and profit model.

To explore the emergence of sustainability in business, searches were conducted on several keywords relating to sustainability in business between 1970 and 2017 on the Scopus database. Scopus is one of the largest abstract and citation databases (Bolden, 2011). Given the proliferation of sustainability literature, this approach sought to supply a substantive, as opposed to comprehensive, view of the literature, which gives a view of the relative proportion of publications per concept over time (Bolden, 2011). The results are displayed in Figure 2.7.

The searches were kept broad to offer as wide a range of applications as possible, with the aim of grasping theoretical and paradigmatic shifts informing research and theorising in corporate sustainability and related disciplines.

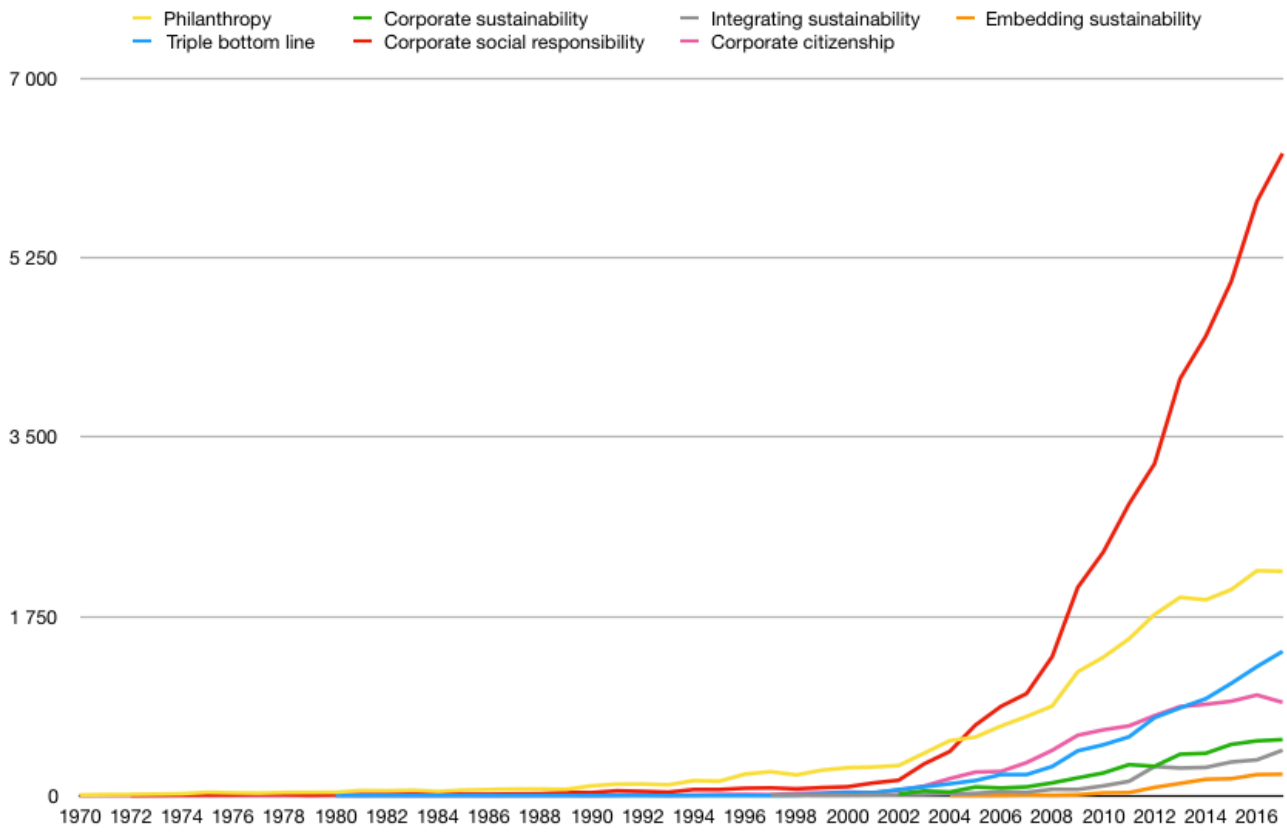

Figure 2.7: Publications on Scopus database (1970-2017)

Whilst there is rapid growth in the number of publications across all keywords, closer inspection reveals “waves” with particular patterns of conceptualisation of sustainability in business. The metaphor of a wave is used as it represents a shift in thinking which continues to co-evolve with subsequent waves, rather than a linear stage model. Table 2.2 displays the date of first publication and the year during which momentum of publication was reached, which is defined as 50 publications per annum. The year of peak publication and number of publications in that year are also depicted. Finally, keywords that emerged simultaneously are clustered into waves of sustainability in business.

The earliest emergence was philanthropy, with initial publications from as early as 1871. It took over 100 years to build up to 50 publications per annum, yet the number of publications keeps

growing; whilst achieving prominence, philanthropy was overshot by corporate social responsibility (CSR). CSR had a later onset with initial publications from 1972, and a 20-year incubation period until momentum was reached in 1994. Subsequent growth in the number of publications was exponential, achieving a dominant status with 6269 publications per annum by 2017. The emergence of philanthropy and CSR may be regarded as constituting the first wave of sustainability in business.

Keywords	**First publication**	**Reached 50 publications per annum**	**Peak publications to date**	**Peak publication number per annum**	**Wave**
Philanthropy	1871	1981	2017	2190	1
Corporate social responsibility	1972	1994	2017	6269	1
Triple bottom line	1980	2002	2017	1407	2
Corporate citizenship	1971	2002	2016	982	2
Corporate sustainability	2002	2005	2017	547	3
Integrating sustainability	1997	2008	2017	443	3
Embedding sustainability	2004	2012	2017	209	3 & 4

Table 2.2: Waves of emergence of sustainability in business

Corporate citizenship emerged together with triple-bottom-line reporting, both keywords gaining momentum in 2002. Corporate citizenship had a longer incubation period of 31 years,

having initial publications at a similar time to CSR, but only emerging later at about the same time as triple-bottom-line reporting. Both keywords grew rapidly, peaking in 2016 and 2017, and represent the second wave in the emergence of sustainability in business.

Between 1997 and 2004 there was a proliferation of terms with initial publications in corporate sustainability, integrating sustainability and embedding sustainability. All three keywords had a very short incubation period of between 3 and 11 years, with momentum reached between 2005 and 2012. These three keywords have been clustered into a third and fourth wave. A summary of each wave is displayed in Table 2.3. Each wave will now be examined and underlying theoretical perspectives informing the conceptualisations of sustainability in business will be identified.

No.	Emergent waves	Sustainability paradigm[2]	Underpinning theories	Sustainability process	Sustainability output
1	Icarian corporate sustainability	Technocentric	Social contract theory, social justice theory, rights theory, deontological theory	Normative change	Sustainability initiatives advance shareholder value by reducing costs or managing risk
2	Sisyphean corporate sustainability	Technocentric	Stakeholder theory, corporate accountability theory	Compliance-driven instrumentalist change	Triple-bottom-line reporting

[2] This column refers to paradigms identified by Gladwin and Kennelly (Gladwin et al., 1995).

3	Achillean corporate sustainability	Sustaincentric	Systems theory, integrating sustainability across a wide range of operational areas of a business	Systemic change	Integrate or embed into business model and organisational practices
4	Promethean corporate sustainability	Sustaincentric	Complexity theory, integral theory	Emergent co-evolutionary process	Coherence between embedment, embodiment and enactment enables co-evolution with containing systems

Table 2.3: Emergence of corporate sustainability

2.5.1 First wave: Icarian corporate sustainability

> "We often forget that when corporations were originally introduced in America in the mid-1800s, it was with the explicit purpose of serving the public good (enshrined in a charter), with liable shareholders" (Visser, 2011, p. 38).

The earliest publications associated with the keyword "philanthropy" date from 1871 with more regular publications from 1895 onwards. This is considered by some authors to be an initial philanthropic phase of corporate social responsibility (Visser, 2011), yet the corporate social responsibility literature emerged from 1972 onwards. Interest in corporate social responsibility was influenced by the publication of the World Commission on Economic Development (WCED) report in 1987 and the publication of special issues in the Academy of Management Review in 1995 and Academy of Management Journal in 2000 (Montiel, 2008).

This first wave represented a somewhat normative view (Valente, 2012) in which management scholars argued for a shift in the underlying worldview in the private sector to harmonise ecological, social and economic domains (Gladwin et al., 1995; Purser, Park, & Montuori, 1995; Shrivastava, 1995; Waddock & McIntosh, 2009). Wilson (2003) argues that this normative view was informed by moral philosophies such as social contract theory, social justice theory, rights theory and deontological theory and promoted ethical arguments to justify businesses addressing sustainability goals.

Corporate social responsibility (CSR) emerged as an approach to dealing with the role of business in addressing the challenges of sustainable development. Within a mainstream CSR view, corporates have four types of responsibilities, namely, (i) the economic responsibility to make profit, (ii) the legal responsibility to abide by society's laws, (iii) the ethical responsibility to do what is right and fair, which might be beyond legal requirement, and (iv) philanthropic responsibility (Carroll, 1999). Hamann (2008) argues for the relevance of CSR as providing a normative view in an African context.

In the first wave, firms recognise new business challenges outside the market, and these challenges are "integrated into existing processes and practices without changing the basic business premise and outlook" (Dyllick & Muff, 2016, p. 163). Thus, business in this view remains focused on creating shareholder value, with the motivation for sustainability initiatives often economic, reducing costs or risks. There is a recognition of the need for responsible business, but it is implemented without altering the corporate form.

This wave of corporate sustainability reflects the myth of Icarus from ancient Greece, in which Icarus attempted to flee Crete using wings his father crafted from feathers and wax. As he did not heed his father's warning, his wings melted as he flew too close to the sun. The legend is a timeless warning of the dangers of hubris, cautioning against the perils of economic growth at all costs. Whilst Icarian Corporate Sustainability recognises the need for responsible business to balance economic, social and ecological domains, the underlying paradigm remains intact and serves only to refine shareholder value (Dyllick & Muff, 2016; van Marrewijk, 2003).

2.5.2 Second wave: Sisyphean corporate sustainability

A second wave saw the emergence of “corporate citizenship” in 1971 and “triple-bottom-line” reporting in 1998, after a single initial publication in 1980. The conceptualisation of sustainability in this wave was influenced by stakeholder theory and corporate accountability theory (Wilson, 2003). Stakeholder theory is a strategic management approach which focuses on creating shared value across multiple stakeholder groups, where a stakeholder is any individual or party affected by or affecting the organisation (Evan & Freeman, 1993; Freeman & McVea, 2001). The application of stakeholder theory resulted in arguments for why businesses should address sustainability goals (Wilson, 2003).

> “The impetus behind stakeholder management was to try and build a framework that was responsive to the concerns of managers who were being buffeted by unprecedented levels of environmental turbulence and change” (Freeman & McVea, 2001, p. 3).

CSR has been extended by stakeholder theory, which suggests that corporations have a responsibility to all stakeholder groups who are positively or negatively affected by the activities of the company (Evan & Freeman, 1993). Hamann (2008) suggests that corporate citizenship contributes to improved governance through the extension of stakeholder theory that is limited by not adequately addressing relational networks between stakeholders. Corporate citizenship (CC) emphasises the view that corporates have rights and responsibilities (Valor, 2005; Waddell, 2000). Matten, Crane, and Chapple (2003) identify three versions of CC, namely, (i) a limited view in which CC is seen as philanthropic involvement, (ii) the equivalent view, which equates CC with CSR, and (iii) the extended view, which reconceptualises business-society relations. Whilst the concept of citizenship has not been adequately defined in this context (Matten et al., 2003; Valor, 2005), CC needs to address a corporation’s value-add to society (Andriof & McIntosh, 2001; Baets & Oldenboom, 2009) to both primary and secondary stakeholders, who are contextually defined (Hamann, 2008).

The United Nations Global Compact (UNGC) is the largest corporate citizenship (Hamann, 2008) and corporate sustainability initiative, with 10 908 actively participating companies from 161 countries (United Nations Global Compact, 2018c). The UNGC promotes corporate citizenship through ten guiding principles relating to (i) human rights, (ii) labour standards, (iii)

environment and (iv) anti-corruption (United Nations Global Compact, 2018d). Corporate citizenship extends beyond financial sustainability and legal compliance which sit at the lower levels of Carroll's pyramid model of CSR (Carroll, 1991), to consider citizenship as decision making that stretches beyond legal duties (Leisinger, 2007), relying on public accountability and enlightened self-interest (Baets & Oldenboom, 2013; Leisinger, 2007), hence "the business case for corporate citizenship is important, but shouldn't be relied on" (Hamann, 2008:31).

This wave brought about a broadening of the stakeholder perspective (Dyllick & Muff, 2016) and the application of corporate accountability theory to sustainability in business increased the focus on why companies should report on sustainability performance (Wilson, 2003). Corporate accountability articulates the relationship between corporate managers and society, setting parameters for triple-bottom-line reporting in which a business reports environmental, social and economic performance (Elkington, 2004; Wilson, 2003). Accountability differs from responsibility in that it refers to the justification of responsibility of the organisation (van Marrewijk, 2003). Corporate accountability is affected by the regulatory environment, which is set by both governmental and international bodies such as the International Integrated Reporting Council. Whilst regulation plays a constructive role in levelling the playing field, enabling innovation and creating shared value (Louw, 2016), it is unlikely that the extent of change needed will be achieved through compliance driven change alone.

This wave thus expands the stakeholder perspective and uses the triple-bottom-line approach to create accountability. Value creation is broadened from shareholder value to include social and environmental values (Elkington, 2004; Wilson, 2003). "Companies create value not just as a side effect of their business activities, but as a result of deliberately defined goals and programmes addressed at specific sustainability issues or stakeholders" (Dyllick & Muff, 2016, p. 164).

Whilst corporate sustainability efforts claim ground in the second wave, approaches run the risk of becoming a Sisyphean endeavour. Sisyphus, in Greek mythology, was condemned to roll an immense boulder up a hill for eternity, only to have it rolling back to hit him over and over again. Intentional sustainability initiatives and a focus on governance are steps in the right direction but stop short of addressing underlying paradigms in a way that allows for meaningful progress towards sustainable development goals.

2.5.3 Third wave: Achillean corporate sustainability

Corporate sustainability emerged alongside a growing interest in embedding or integrating sustainability. This diversification of sustainability terms illustrates a shift from early conceptualisations of corporate social responsibility which encompassed charitable donations (philanthropy) and public relations (marketing) to integrating sustainability into management systems (strategic) and business models (systemic) (Visser, 2011). Seen in this way, corporate social responsibility develops in multiple ways. In clarifying the shift from corporate social responsibility to corporate sustainability, it is important to emphasise that they are both "voluntary business activities…which enable the firms to interact with their stakeholders" (Lo, 2010, p. 312).

Montiel (2008) distinguishes between the constructs of corporate social responsibility and corporate sustainability: "corporate sustainability scholars often speak of paradigmatic issues from an eco-centric paradigm. Corporate social responsibility arguments seem to fit better within the existing business paradigm, with its strategically focused anthropocentric paradigm" (Montiel, 2008, p. 259). Whereas there is a lot of attention on the integration or embedding of sustainability into business, the key differentiator in the third wave is the rationale used for this integration. Whilst in the second wave sustainability initiatives are simply a means towards growing shareholder value, in the third wave corporate sustainability requires that businesses "translate sustainability challenges into business opportunities making 'business sense' of social and environmental issues" (Dyllick & Muff, 2016, p. 166).

The United Nations Global Compact (UNGC) can be seen to have developed from a second to a third wave approach with increasing focus on integrating sustainability into the business through alignment with the sustainable development goals. The UNGC proposes a three step process of (i) defining and prioritising SDG targets, (ii) measuring and analysing and (iii) reporting, integrating and implementing change (United Nations Global Compact, 2018b). The most recent progress report shows that 79% of participant companies report having embedded corporate responsibility in their strategies and operations with targets at 64% of companies being formulated or approved at board level (United Nations Global Compact, 2018a). This shows increasing traction being created by third wave corporate sustainability.

SustainAbility is the oldest sustainability consulting firm in the world and played a leading role in promoting the triple bottom line (Elkington, 2004); it has shifted to a third wave focus on integrating sustainability, defined as “incorporating sustainability into the business strategy such that the business model creates social and environmental value in addition to financial value” (Mosher & Smith, 2015, p. 23). Metcalf and Benn (2012) call for the redesigning of organisations as social technology to create a better functional fit between the organisation and its containing complex interconnected and dynamic environmental, economic and social systems.

The third wave represents a valuable shift in sustainability towards a sustaincentric paradigm. This shift saw sustainability begin to enter the mainstream in organisations, rather than being relegated to a peripheral set of activities. This wave has been named Achillean corporate sustainability as it represents a heroic shift forward, achieved by the warrior-like efforts - reminiscent of the efforts of Achilles in the Trojan war - of academics and sustainability practitioners alike. The shift to a sustaincentric paradigm is laudable, yet an Achilles heel remains. Whilst sustainability is integrated into, or embedded in, multiple aspects of the business, there is a neglect of the individual-interior dimension which is crucial to the embodiment of sustainability that enables self-organisation and emergence. This next wave is still nascent in the literature and represents an important extension of the third wave.

2.5.4 Fourth wave: Promethean corporate sustainability

The fourth wave displays an emergent shift in corporate sustainability. It is not a departure from the third wave but rather extends it by building coherence between embedded corporate sustainability - which seeks to address the co-evolution of the firm with its environment - and the embodiment of corporate sustainability at the level of agent, which together support the enactment of corporate sustainability. Thus, the focus shifts from a systemic approach to emergence in the system.

A substantial contribution to this wave came from a complexity theory perspective (Baets & Oldenboom, 2009; B. Brown, 2011; Chapman, 2016; Edwards, 2010; Laszlo et al., 2012; Metcalf & Benn, 2012; Valente, 2012; Wells, 2013), with several authors advocating the need for complex thinking as central in tackling sustainable development (Cavanagh, 2013; Chapman, 2016; Morin, 1999; Wells, 2013). The embodied domain of corporate sustainability

reflects this in an ontological level shift towards a sustaincentric paradigm (Gladwin et al., 1995; Valente, 2012).

Adopting a complexity perspective has important implications for how a sustaincentric paradigm is conceptualised: Valente (2010, p. 441) cautions against “the danger of examining shifts in business paradigm in isolation without properly appreciating the interconnectedness of the private sector with a number of agents in a complex adaptive system”. Thus the paradigm informing this fourth wave of corporate sustainability can be seen as a perceptual shift in which “organisations recognise their agent status amongst a much wider and highly complex array of interconnected, dynamic economic, environmental and social systems” (Metcalf & Benn, 2012, p. 195).

Fourth wave corporate sustainability thus broadens the focus on embedding sustainability to include the embodiment of sustainability. Embodiment can be conceptualised in different ways. It can be viewed as a green narrative (Starkey & Crane, 2003), narrative infrastructure (Schulschenk, 2018), “creation of a consciousness of connectedness between the world of human beings and all other forms of life” (Laszlo et al., 2012, p. 37), or a culture “in which organizational members hold shared assumptions and beliefs about the importance of balancing economic efficiency, social equity and environmental accountability” (Bertels, 2010, p. 10). Embodiment can also be seen from a developmental perspective in which value systems result in shared principles which inform corporate sustainability (van Marrewijk & Werre, 2003).

The Promethean approach to corporate sustainability brings together embedded and embodied domains of corporate sustainability; this enables the enactment of corporate sustainability whereby the business co-evolves with its environment. The concept of enactment, which is drawn from cognitive theory, suggests that experience and knowledge result from the interaction between brain, body and environment (Varela, Thompson, & Rosch, 1991). The fourth wave approach is thus named Promethean corporate sustainability due to the fundamental way in which the shift in paradigm enables emergent co-evolution with the environment.

When Zeus, the god in Greek mythology who ruled Mount Olympus, threatened to destroy humankind, the titan Prometheus gave humans the gifts of fire (novelty) and hope. Prometheus means forethought. The advent of fire was a critical evolutionary step that resulted in the dawn

of civilisation (Harari, 2011). The story of Prometheus, the rebel who stole fire from the gods, is found in many cultures. Some scholars believe that the domestication of fire 300 000 years ago and the ability to cook food may have resulted in the shortening of human intestines, freeing up metabolic resources for the growth of the human brain (Gibbons, 2007). Thus, the myth of Prometheus provides a useful analogy for fourth wave corporate sustainability in which coherence across multiple levels of system results in a co-evolutionary process of emergence.

2.6 Emergent corporate sustainability

Emergent corporate sustainability is an example of fourth wave Promethean corporate sustainability. This section will discuss the construct of emergence and apply it to build a fourth wave corporate sustainability framework. Coherence, as a property of emergence, will be discussed and applied across embedded, embodied and enacted levels of corporate sustainability.

Emergence theory is a useful framework for understanding the relationship between actors (intervenors) and observers (monitoring and evaluating) of corporate sustainability and is recommended as a strategy for future research (Bender & Judith, 2015), as well as the utilisation of emergent dynamics towards sustainable enterprise (Twomey, 2006), yet the benefits of an emergence theory framework in corporate sustainability remain largely unexploited. Twomey (2006, p. 22) suggests that “the gap between complexity theory and the language of management sometimes limits our awareness of emergence”.

Normative, instrumentalist driven change and systemic integration have all been insufficient to address the disconnect between corporate sustainability and the declining environment. Understanding the process of emergence is of central importance if the programme of corporate sustainability is to make a meaningful difference to the super-wicked problem of sustainable development. The phenomena addressed by corporate sustainability present a challenge because of their span and complexity:

> “Most fundamentally, ecological and socio-economic systems are complex, adaptive systems, integrating phenomena across multiple scales of space, time and organizational complexity” (Levin, 2006, p. 328).

The complex and transdisciplinary nature of these systems requires networks of diverse agents to collaboratively design novel approaches to address a wide range of issues. The extent and urgency of the change required makes it unlikely that traditional top-down hierarchical linear approaches to change will be sufficient. The necessary reductionism and partial perspectives of any agent or group of agents mean that it is more useful to create conditions in which emergence is likely to occur.

Emergence is defined as “the arising of novel and coherent structures, patterns and properties during the process of self-organisation in complex systems” (Goldstein, 1999, p. 49). Wetness is an example of an emergent property which can’t be derived from its constituent components (Holland, 1998). While complex systems have many characteristics, Chiles, Meyer, and Hench (2004, p. 502) describe the concept of emergent self-organization as complexity theory's “anchor point phenomenon”. The concept of emergence was first coined by Lewes (1875, pp. 368–369):

> “…although each effect is the *resultant* of its components, we cannot always trace the steps of the process, so as to see in the product the mode of operation of each factor. In the latter case, I propose to call the effect an *emergent.* It arises out of the combined agencies, but in a form which does not display the agents in action”.

Emergence must be considered at a macro level arising from the dynamics of a complex system:

> “Emergence describes the processes that allow for the properties at the scale of the system, that cannot be discerned by examining only the parts individually, but must be understood through dynamics throughout the system” (Wells, 2013, p. 38).

Emergence is closely related to self-organisation at the boundary between system and environment (Fromm, 2005). Emergence is common in complex adaptive systems such as a flock of birds, neural networks or the economy in which the behaviour of the whole is more complex than that of its parts. In organisations “it is in many, many ongoing local interactions that there emerges coherent organisational patterns across the population of an organisation’s members and across the populations of other organisations they interact with” (Stacey, 2010, p. 160).

Emergence as a process arises when simple rules in the behaviour of agents results in the formation of complex patterns (Holland, 1997). Figure 2.8 shows high level patterns appearing from lower-level components, thus highlighting bottom-up processes with top-down feedback (Fromm, 2005).

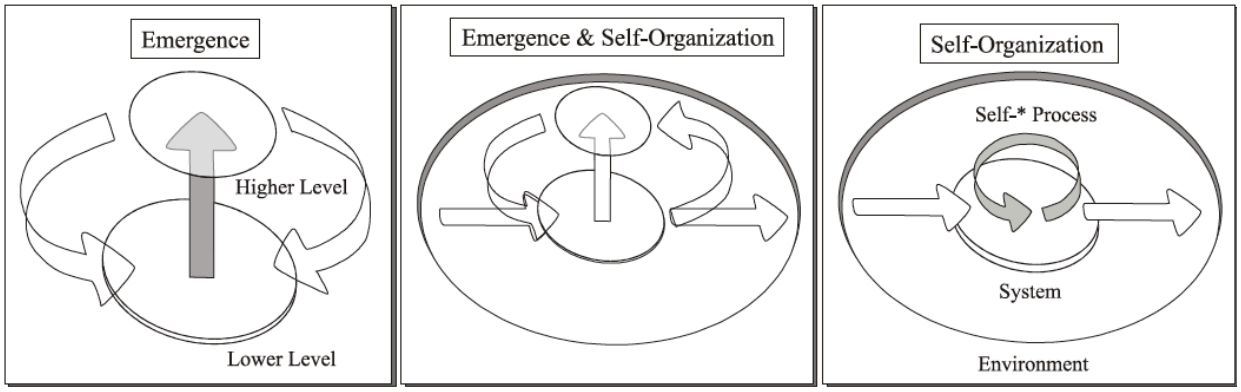

Figure 2.8: Self-organisation and emergence; from the left to right: emerging, self-perpetuating and self-organising patterns

Source: Fromm (2005, p. 2)

Emergence is not a static property of a system but a perceived moment in time, and can be seen as a dynamic property of the system (Abraham & Shaw, 1987; Gleick, 1987). Emergence can be characterised as strong or weak, where strong emergence cannot be derived from a comprehensive understanding of the constituents, whilst weak emergence is just unexpected with reference to the properties of the lower-level components (Chalmers, 2006). Emergent phenomena share several interrelated properties (Goldstein, 2000), which are displayed in Table 2.4:

Properties of emergent phenomena	**Description of property**
Radical novelty	Emergent phenomena cannot be deduced from lower level components or anticipated as they have not previously been observed in the system.

Coherence	Emergent phenomena present as integrated wholes which maintain some sense of consistency or identity. Lower level components are constituted into a higher level form or identity.
Global or macro level	Emergent phenomena occur at the macro level as the scope of the phenomena spans across multiple constituent lower level elements. The behaviour of emergent phenomena is thus observed at the macro level.
Dynamical	Emergent phenomena arise as the system evolves, and as new attractors arise in dynamical systems.
Ostensive	Emergent phenomena are ostensively recognised and emerge slightly differently each time due to non-linear interactions in complex systems.

Table 2.4: Properties of emergent phenomena

Source: Goldstein (2000, p. 50)

An emergent perspective suggests an open-ended view of corporate sustainability in which there are multiple potentials that agents can act on, and through which adaptation and feedback - co-evolutionary processes - can ensue. This involves intelligent agents going through a process of learning, hence “any serious study of emergence must confront learning” (Holland, 1998, p. 53); the environment is not a pre-existent background but rather a network of nested systems with dynamic interactions.

Construing the journey to a sustainable future as emergent rather than a process of change highlights the opportunities hidden in the threats, where “emergence appears as the Janus face of constraint” (Wells, 2013, p. 38). Stacey (2010, p. 81) cautions against re-presenting the dominant discourse of organisations where executives are assumed to be able to choose the direction of their organisation and create the necessary conditions and structures for achieving it, using a complexity lexicon in which “emergence does not refer to a force that someone can operate on or a process that someone can use another process to shape or condition” (Stacey, 2010, p. 81). Rather than resulting from planned change, emergence arises from the interaction of many agents at a local level. Seen from this perspective, “sustainability is viewed as an

emergent quality that occurs when the interactions within the system, and between the system and its environment are nourishing" (Bender & Judith, 2015, p. 1).

Unfortunately, despite much progress in corporate sustainability the interactions between organisations and the environment remain far from nourishing. Navigating these changes should be seen, from the perspective of emergence, not as adapting to a fixed environment but as emerging in a co-evolutionary, rather than a deterministic, manner.

2.6.1 Coherence in emergent corporate sustainability

For the relationships to be nourishing, there needs to be coherence within and across multiple levels of system. Coherence as discussed in this section is considered a fundamental property of emergent corporate sustainability. The integral quadrants model and its application to the Cassandra model will be presented and used to conceptualise the firm and corporate sustainability in a more holistic manner. The Cassandra model will be explored as a means of assessing the level of coherence in an organisation.

Whilst there has been a tendency for firms to apply mechanistic metaphors such as "alignment" to centralised hierarchical control, "distributed, decentralised control makes a system more flexible, and therefore increases its survivability" (Cilliers, 1998, p. 111). From this perspective, over-reliance on autocratic management results in the degeneration of a system where central control is rigidly applied (Cilliers, 1998). Coherence is a more useful construct as it describes the dynamic process of interaction between agents, which makes emergence in complex transdisciplinary contexts more likely. Emergence requires novelty but also coherence in structures, patterns and properties of the complex adaptive system (Goldstein, 1999). These structures, patterns and properties arise through the interaction of many agents across the system (Goldstein, 1999; Stacey, 2010).

Coherence was first applied to the conceptualisation of human action geared towards common aims by Bohm (1996), who borrowed the term from physics where lasers exhibit coherence between photons. Coherence in physics describes the extent to which there is synchronisation or coupling between different oscillating systems, that when operating at the same frequency can become phase- or frequency-locked (McCraty, 2015). Similarly, Arecchi (2010) applies the

ideas of laser coherence to develop a model of neuron synchronisation leading to coherent perceptions.

Coherence is defined as “the degree of order, harmony, and stability in various rhythmic activities, which reflects the regulation of interconnected biological, social, and environmental networks” (McCraty, 2017, p. 2). Coherence is “long range order in space or time” (Arecchi, 2008, p. 157) and can occur in different forms. Auto-coherence occurs when activity within a single system is coherent. “When coherence is increased in a system that is coupled to other systems, it can pull the other system into increased synchronisation and more efficient function” (McCraty, 2015, p. 24). Coherence will now be explored at multiple levels of system, displayed in Table 2.5.

Level of coherence	**Description**
Physiological	Entrained multiple oscillating systems such as when respiration and heart rhythms operate on the same frequency (McCraty, 2015) Neuronal coherence which measures the interconnectedness of brain regions (Waldman, Balthazard, & Peterson, 2011)
Cognitive	Interaction and synchronisation between external stimuli and sematic memory (Arecchi, 2008)
Social	Collective cohesion and action (McCraty & Shaffer, 2015) Sensemaking process when confronted with novelty (Lissack & Letiche, 2002) Freedom for team members to self-organise whilst maintaining cohesion and strategic resonance (McCraty, 2015, p. 28)
Organisation	Global coherence amongst synchronised subsystems (McCraty & Shaffer, 2015) Co-evolution of integral quadrants (Edwards, 2010)

	Outcome of resilience in systems (Lissack & Letiche, 2002; McCraty, 2015) Narrative infrastructure which facilitates meaning making (Schulschenk, 2018)

Table 2.5: Level of coherence

Coherence can be explored across multiple levels of system. Coherence can also be understood at the level of interacting physiological systems. Cross-coherence occurs when multiple oscillating systems become entrained, such as in physiology, when respiration and heart rhythms operate on the same frequency (McCraty, 2015). This is known as heart or cardiac coherence. Cardiac coherence has been shown to be associated with positive emotions and optimal performance. It is measured by heart rate variability analysis where the heart rhythm becomes sine wave-like at around 0.1 hertz (McCraty, 2015).

At a cognitive level, neuronal coherence in the brain is a "way of measuring the interconnectedness of areas of the brain" (Waldman et al., 2011, p. 62). The interaction between external stimuli (bottom-up signals) and the use of semantic memory (top-down use of control parameters) creates synchronisation which is an indication of conscious perception (Arecchi, 2008). Coherence was used in previous research as a proxy for consciousness (Baets, Oldenboom, & Sewchurran, 2016; Naidu, 2011). "Complexity arises whenever an array of coupled dynamical systems displays multiple paths of coherence. Creativity corresponds to the selection of a coherent path within a complex nest" (Arecchi, 2008, p. 157).

Social coherence describes a relational level which enables collective cohesion and action, where "social coherence is reflected as a stable, harmonious alignment of relationships that allow for the efficient flow and utilisation of energy and communication required for optimal collective cohesion and action" (McCraty, 2015, p. 28). The use of coherence at a social level can be described as a sense-making process with "missing links at hand when confronted with something new" (Lissack & Letiche, 2002, p. 76), and involves a creative act in choosing between multiple paths of coherence (Arecchi, 2008).

The use of coherence at a social level has been criticised as an example of theorising from physical metaphors that results in the erosion of agency, and for negating the important role of incoherencies in social systems (Krippendorff, 1999). The conceptualisation of coherence,

however, does not imply the absence of incoherence or agency, as McCraty (2015, p. 25) points out: “coherence does not mean everyone or all parts of a system are doing the same thing simultaneously”.

Organisational coherence involves global coherence amongst synchronised subsystems, and is an outcome of the resilience of the system (Lissack & Letiche, 2002; McCraty, 2015). Organisational coherence includes, but goes beyond, social coherence, which describes a relational level that enables collective cohesion and action (McCraty & Shaffer, 2015). Operationalised at the level of team, coherence is “freedom for the individual members to do their part and thrive whilst maintaining cohesion and resonance within the group’s intent and goals” (McCraty, 2015, p. 28).

When addressing coherence in corporate sustainability, we must conceptualise it at the level of the organisation. The integral quadrants model (Wilber, 2001), displayed in Figure 2.9, is useful in this regard as it facilitates a holistic conceptualisation of a firm, allowing us to perceive the extent to which interactions between agents, system and environment are nourishing (Bender & Judith, 2015). The model consists of two dichotomies, namely exterior-interior and individual-collective, which together create four quadrants. The upper left quadrant describes individual-interiors. This is the subjective “I” associated with the perceptions, emotions and worldviews of agents in the system. The upper right quadrant describes individual-exteriors. This is the objective “it” associated with objective aspects. For example, the subjective experience of a certain state of mind or consciousness in the upper left quadrant shows up in the upper right quadrant as neural networks which can be seen on an fMRI scan, or in the manifest behaviour of the agent. The lower right quadrant describes collective-exteriors. These are the interobjective “its” associated with social aspects of the collective such as systems, structures and exterior aspects of the environment. The lower left quadrant describes collective-interiors. This is the intrasubjective “we” of relationship and culture.

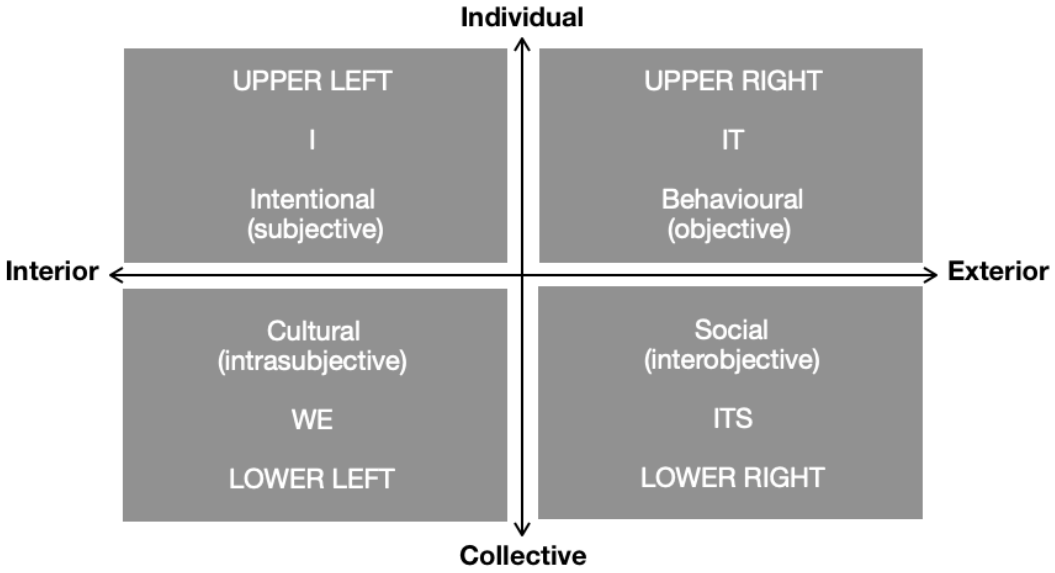

Figure 2.9: Integral quadrants

Source: Adapted from Wilber (2001, p. 71)

Coherence has been implemented at an organisational level using Wilber's (2001) integral quadrants model, in which sustainability requires "balanced, long-term 'coevolution' of these four quadrants" (Edwards, 2010, p. 176). Organisational coherence must be conceptualised in a way that allows us to "consider multiple and incommensurable logics to be an essential ingredient of social realities" (Krippendorff, 1999, p. 8).

Baets and Oldenboom (2009, 2013) developed a holistic model and assessment of a firm, the Cassandra model, through implementation of Wilber's (2001) integral quadrants model. The model assumes Wilber's integral quadrants as the developmental domain by advocating that both individuals and organisations are assessed and developed across all domains. Baets and Oldenboom (2013) emphasise the importance of moving beyond a mechanistic approach which traditionally focused on exterior domains towards holistic development across all domains, as displayed in Figure 2.10.

This approach can be classified as an integral Q approach (Cacioppe & Edwards, 2005) in that it integrates and situates distinct theories and models from different domains, but doesn't emphasise levels of development. The full All Quadrants All Levels model (AQAL) integrates domains, lines and levels of development, types and states (Wilber, 2000). An integral Q

approach is advantageous when operationalising coherence as it focuses on emergent processes across all organisational domains that represent an array of coupled dynamical systems out of which arise multiple paths of coherence that can be selected (Arecchi, 2008). Coherence thus represents an emergent potential to increase synchronisation and efficient functioning between coupled systems (McCraty, 2015).

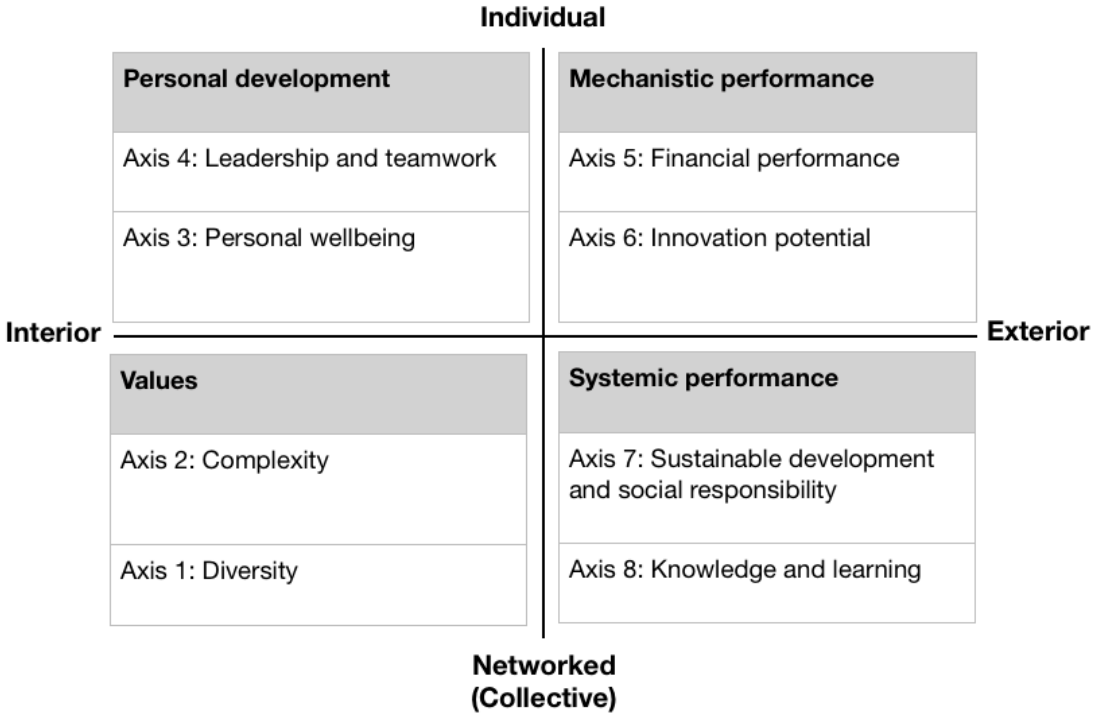

Figure 2.10: Cassandra axes

Source: Adapted from Baets and Oldenboom (2009, p. 146)

Sustainability has traditionally been seen to require that “the firm has a symbiotic, co-evolving relationship with the greater society and ecosystem” (Stead & Stead, 2004, p. 73). However, Wilber (2000, p. 183) suggests that “it is not enough to say that organism and environment co-evolve; it is not enough to say that culture and consciousness co-evolve. All four of those ‘tetra-evolve’ together”. This tetra-evolution involves synchronisation between coupled systems which can be operationalised by considering levels of coherence between the Cassandra model axes. Baets and Oldenboom (2009, pp. 143–144) follow this approach, indicating that “sustainability, sustainable development, sustainable performance, and corporate responsibility only find a conceptual basis within a holistic view on management.

Within classic managerial approaches, other than for personal (or corporate) ethical motivation, there is no reason or space for a company to be responsible or sustainable". Thus tetra-evolution is fundamental to emergent corporate sustainability.

Baets and Oldenboom (2013) have operationalised the integral quadrants model at an organisational level, advocating a holistic approach to management involving the interweaving of all four integral quadrants towards sustainable performance. Each domain has two axes which describe the domain and allow for the assessment of a firm. The Cassandra domains are described in Table 2.6.

Cassandra domain	**Description of domain**
Values	The values domain is in the interior-collective integral quadrant and contains the diversity and complexity axes. "A systemic view on the company starts with a thorough reflection on values" (Baets & Oldenboom, 2013, p. 133). Values are activated through networks of diverse agents where these networks have developed the capacity to operate in complexity.
Personal development	The personal development domain is in the individual-interior quadrant and contains the personal wellbeing and leadership and teamwork axes. This domain acknowledges the link between the level of satisfaction and engagement in the workplace and the level of contribution to the company (Baets & Oldenboom, 2009).
Mechanistic performance	The mechanistic performance domain is in the individual-exterior quadrant and contains the financial performance and innovation potential axes. Financial considerations are considered relative to peer group, and sustaining performance over the longer term requires the capacity for innovation (Baets & Oldenboom, 2009).

Systemic performance	The systemic performance domain is in the collective-exterior quadrant and contains the sustainable development and social responsibility and knowledge and learning axes. This is a systemic view of the company which combines a focus on sustainability management with the adaptive process of learning and knowledge management (Baets & Oldenboom, 2009).

Table 2.6: Cassandra domains

The Cassandra model, being integrally informed, provides a means to holistically conceptualise and assess an organisation. It also provides a means whereby the level of coherence can be determined.

2.6.2 Levels of emergent corporate sustainability

Emergent corporate sustainability can be seen where coherence develops between the embedded, embodied and enacted levels of corporate sustainability. Each level of system will be discussed. As a fourth wave or Promethean approach to corporate sustainability, emergent corporate sustainability focuses on embedding sustainability in the business whilst broadening the focus to embody sustainability at the level of agent in order for sustainability to be enacted.

Embedded level

This level considers how sustainability is embedded in the business, whereby sustainability is mainstreamed into business activities and sustainability challenges are translated into business opportunities. This requires the business to move towards a co-evolutionary interaction with its environment.

The embedded level is addressed in a rigorous manner as per third wave (Achillean corporate sustainability) and extended into fourth wave (Promethean corporate sustainability). The embedded domain is ultimately about transforming the firm for a better functional fit with the containing systems (Metcalf & Benn, 2012).

Embedding sustainability develops through various stages. So, whilst the literature review in this chapter considered waves of emergence in corporate sustainability in the academic literature, stage models consider the developmental stages an organisation passes through to

embed sustainability, and thus are useful for understanding the level at which sustainability needs to be embedded in Promethean corporate sustainability.

Whilst a critique of developmental theories is beyond the scope of this chapter, Edwards (2010) developed a stage model from a synthesis of van Marrewijk and Werre (2003), and Dunphy, Griffiths, and Benn (2003), incorporating Graves's (1974) evolutionary progression of value structures, which are indicated as preconventional, conventional, postconventional and post-postconventional levels in Table 2.7.

The development of corporate sustainability, which Edwards (2010) refers to as organisational sustainability, can be seen to transcend through stages in an inclusive way in which formative stages are included within later stages, resulting in increasing levels of complexity and integrative forms of organisational sustainability (Edwards, 2010). Despite a general direction towards more complex and integrative forms of organisational sustainability, an emergent approach suggests a multiplicity of pathways for development. Fourth wave forms of corporate sustainability are associated with postconventional levels and upwards.

Stages of sustainability	**Stages of organisational sustainability**	**Description of stage**
Preconventional	Subsistent organisation	Sustainability is about survival and maximisation of profit.
	Avoidant organisation	Sustainability as an attack by oppositional groups. Ignorance and apathy towards ethical standards and legal requirements.
Conventional	Compliant organisation	Sustainability as import; emphasises compliance to traditional ethical and legal standards.
	Efficient organisation	Sustainability is valued as a source of cost saving. Emphasises the business case for sustainability.

Postconventional	Committed organisation	Values sustainability as balancing of economic, social and environmental domains. Goes beyond legal compliance and sees the organisation as interconnected systems.
	Sustaining organisation (local)	Sustainability is seen and valued as a way of developing the organisation and its stakeholders. Transformational strategies are employed to move towards triple-bottom-line goals whilst supporting host communities despite regulatory environment.
Post-postconventional	Sustaining organisation (global)	Sustainability is embedded in all aspects of the organisation and is perceived in global and intergenerational perspectives. Sustainability relates to multiple levels of purpose (physical, economic, environmental, emotional, social and spiritual).

Table 2.7: Stages of organisational sustainability

Source: Edwards (2010, pp. 158–159)

Achieving postconventional and post-postconventional stages of organisational sustainability requires organisations to move beyond the integration or embedding of sustainability to incorporate embodied sustainability in which fundamental shifts in the functioning of the organisation as a complex adaptive system emerge as agents shift the perspective or ethos from which they operate. The development of value structures in sustainability leaders results in sustainability interventions being designed in a way that is grounded in transpersonal meaning, use of complexity approaches, and adaptive management of the intervention in dialogue with the system (Brown, 2011), highlighting a need for emphasis on embodiment.

Embodied level

The enduring disconnect between corporate sustainability activities and the ongoing decline in the environment suggests that embedding sustainability is necessary but insufficient to support the emergence of corporate sustainability. By extending our focus to consider how sustainability is embodied, we are able to build a conceptual model to describe conditions in which self-organisation and emergence are more likely. Embodiment recognises that most thought is cognitively unconscious, in that the majority of cognition happens below conscious awareness, such as neuronal processes, which are not accessible to introspection (Lakoff & Johnson, 1999). To create conditions that encourage the emergence of corporate sustainability, it is thus important to consider how corporate sustainability is embodied. Embodiment considers cognition with respect to bodily experience:

> "By using the term embodied we mean to highlight two points: first that cognition depends upon the kinds of experience that come from having a body with various sensorimotor capacities, and second, that these individual sensorimotor capacities are themselves embedded in a more encompassing biological, psychological and cultural context" (Varela et al., 1991, pp. 172–173).

An embodied level of corporate sustainability suggests that an agent does not decide to enact sustainability in a purely rational and disembodied sense. Rather the "very structure of reason itself comes from the details of our embodiment. The same neural and cognitive mechanisms that allow us to perceive and move around also create our conceptual systems and modes of reason" (Lakoff & Johnson, 1999, pp. 3–4). Since corporate sustainability focuses on complex phenomena across wide temporal ranges and spatial scopes, agents may have a disembodied conceptual experience of important phenomena, potentially inhibiting action.

For corporate sustainability to be embodied, it must extend beyond the usual focus on upper right (behaviours) and lower right (systems), to include upper left (consciousness, worldviews) and lower left (culture). Wilber's integral quadrants model is displayed in (a) in Figure 2.11. Whereas an emphasis on all quadrants (c) results in the greatest potential for development, most organisations focus on exterior quadrants only (b), thereby compromising their development (Putnik, 2009).

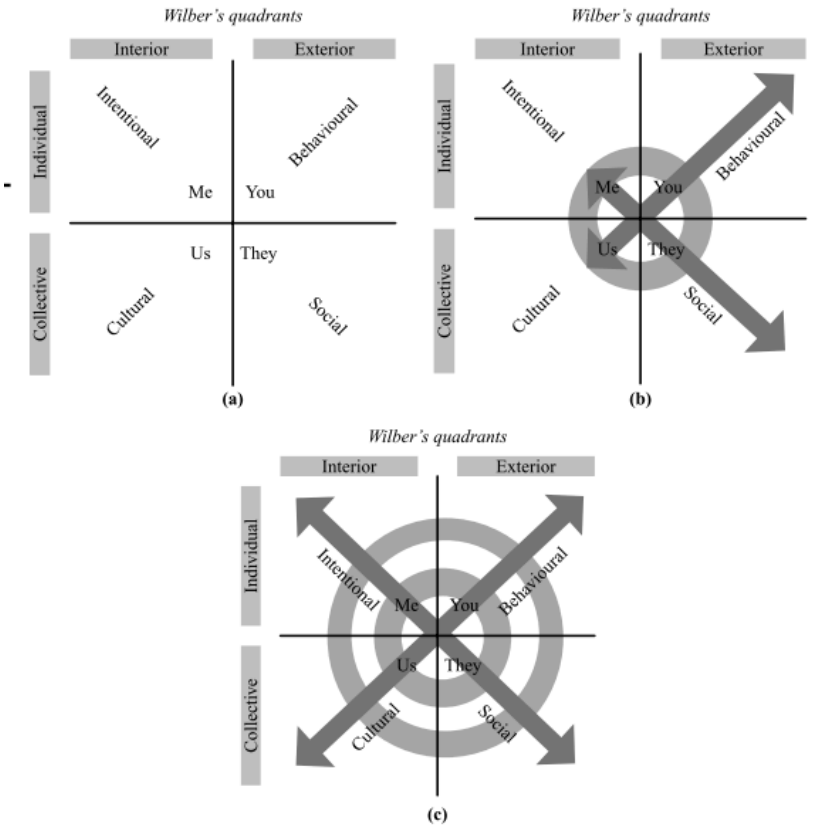

Figure 2.11: Wilber's integral quadrants as developmental domains

Source: Putnik (2009, p. 264)

Embodiment of corporate sustainability enables self-organisation by effecting sensorimotor capacities within the biological, psychological and cultural context of the agent. This level affects the self-organising structures of the agent as complex adaptive system, thereby enabling emergence through the enaction of sustainability across a network of agents. The next section will consider this enacted level of corporate sustainability.

Enacted level

The enacted level of corporate sustainability extends the notion of an embodied mind to consider *embodied action* in the context of the containing system. This is a crucial consideration for corporate sustainability which needs to be enacted both in the context of a network of agents operating in concert and in interaction with the containing ecosystem. The

concept of enactment was introduced into cognitive science by Varela, Thompson, and Rosch (1991, p. 9):

> "We propose as a name the term enactive to emphasize the growing conviction that cognition is not the representation of a pregiven world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs".

This approach draws on the philosophy of Merleau-Ponty by acknowledging a circularity between the self and the world (Varela et al., 1991), which is consistent with the holistic approach, involving both interior and exterior domains, of the Cassandra model (Baets & Oldenboom, 2009) and the integral quadrants (Wilber, 2000). The guiding metaphor for this approach was drawn from the words of poet Antonio Machado: "Wanderer the road is your footsteps, nothing else; you lay down a path in walking" (Varela in Thompson, 2007, p. 13).

Enactment is thus a process of emergence, which shifts the discourse from one of the mind seeking to represent reality and using this representation to address the challenges associated with corporate sustainability, to the mind emerging through the coupling of organism and environment, as part of a co-evolutionary process. This approach suggests that "the human mind emerges from self-organizing processes that tightly interconnect the brain, body and environment at multiple levels" (Thompson, 2007, p. 37). In the context of corporate sustainability, it is important to include the levels of individual, group, organisation, industry, socio-cultural environment and global environment, at each level considering both interiors and exteriors as an expanded version of the integral quadrants (Edwards, 2009). The enactive approach is based on five key ideas, which have been drawn from Thompson (2007):

1. Organisms are autonomous agents actively generating and maintaining themselves, thereby enacting their cognitive domains.

2. The nervous system of the organism is an autonomous dynamic system which generates and maintains coherent activity patterns and meaning as opposed to processing information.

3. Cognition is situated and embodied in action, whereby cognitive structures and processes emerge from recurrent patterns of perception and action in the sensorimotor system.

4. The contextual domain of the organism is enacted through autonomous agency and coupling between the organism and environment, as opposed to a prespecified world being represented by its brain.

5. Experience is central to understanding the mind.

Enactment suggests an emergent process which is inherently creative, as opposed to conceptualising corporate sustainability as a predictable sequence of steps achieved through the management of a linear process of change. This perspective also implies that knowledge and know-how emerge from the co-evolutionary process itself rather than relying on sustainable actions following from a process of knowledge transfer from expert to agent. This is essentially a phenomenological endeavour where “enaction is the idea that organisms create their own experience through their actions” (Hutchins & Alač, 2004, p. 428).

2.6.3 Emergent corporate sustainability framework

This section presents the conceptual model for this study, an emergent corporate sustainability framework, which is displayed in Figure 2.12. The framework shows coherence at multiple levels which together support the emergence of corporate sustainability.

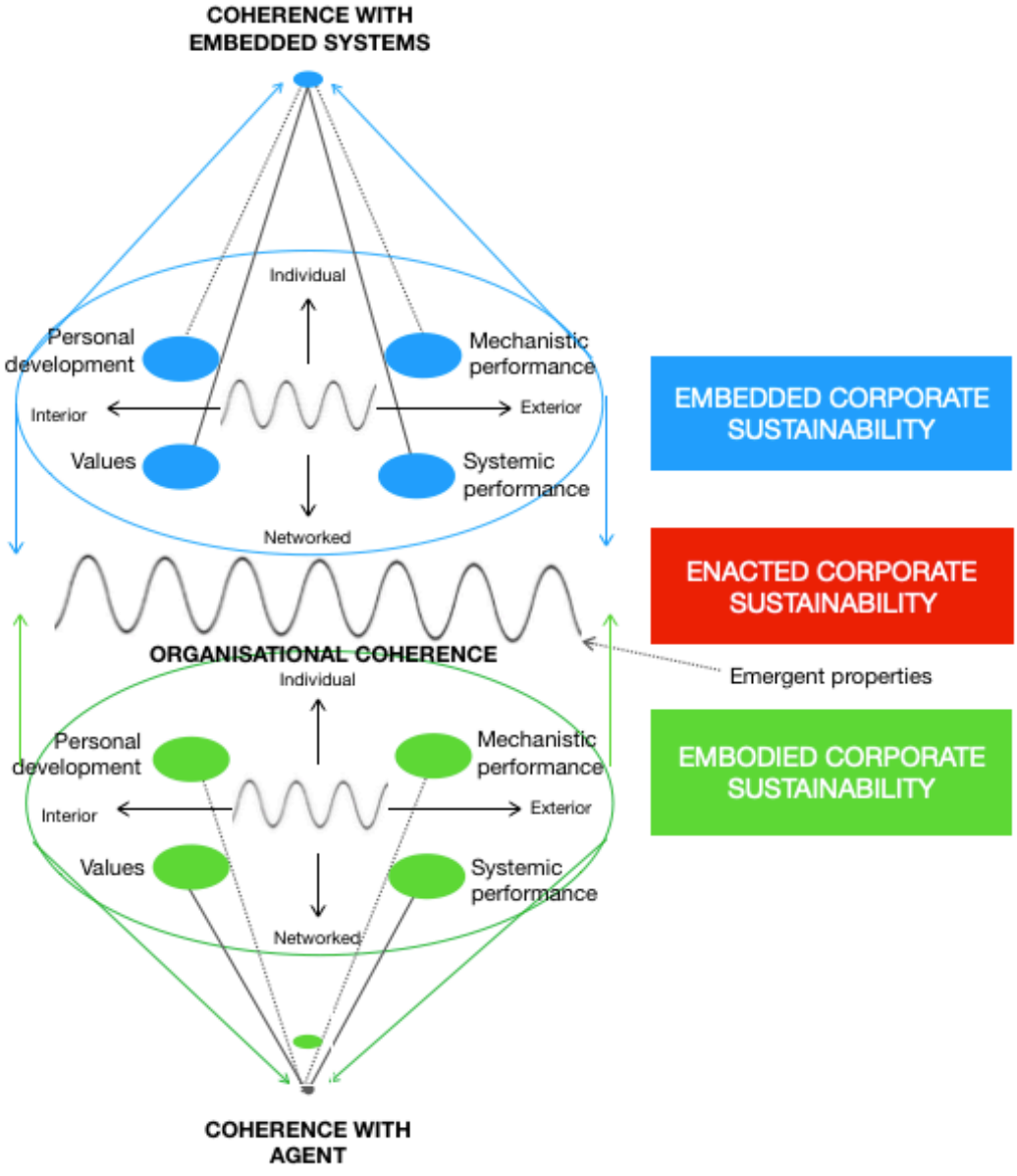

Figure 2.12: Emergent corporate sustainability framework

The framework proposes an emergent approach to corporate sustainability, where embedding sustainability into the organisation whilst embodying it at the level of agents allows for

coherence to emerge; this enables sustainability to be enacted through a self-organised co-evolutionary process.

The framework extends the customary economic, social and environmental triad of corporate sustainability using the Baets and Oldenboom (2009, 2013) Cassandra model which provides an integral view of a business towards sustainable performance. Four domains - values (collective-interior), personal development (individual-interior), mechanistic performance (individual-exterior) and systemic performance (collective-exterior) - are represented at the base of each triangle. Each domain is extended towards a point of intersection, or coherence, at different levels of system.

These zones of coherence create vantage points in the complex system, through which tensions at multiple levels of system can be addressed through self-organisation. Emergence can be seen as a process of sensemaking within a context of constraint. Emergence is depicted by waves in Figure 2.14, and across multiple levels of system. Organisational coherence mediates coherence at the levels of individual and embedded system.

2.7 Conclusion

This chapter provided a theoretical background to the study. The global polycrisis of sustainability was positioned as a complex and transdisciplinary problem, resulting in an uncertain business environment. The corporate sustainability literature was analysed and found to emerge through four waves, which move from a normative orientation in the first wave to a compliance-driven orientation in the second wave. The third wave has a more systemic orientation in which sustainability is embedded in the business. This is extended in the fourth wave using a complexity approach to focus on corporate sustainability as an emergent co-evolutionary process. This study presents an emergent corporate sustainability framework as a fourth wave approach to corporate sustainability and develops the concepts of emergence and coherence.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design and methods. The philosophical assumptions underpinning the research are discussed. The use of a complexity ontology and epistemology is justified and implications for the study set out. The research design is explored and the selection of a mixed method explanatory sequential design described. The selection of cases and multiple case study design are discussed. The quantitative and subsequent qualitative phases of the research are explained.

3.2 Ontological and epistemological framework

The study focuses on the phenomenon of emergence in the context of corporate sustainability. Since sustainable development and climate change are a complex set of phenomena and emergence is a property of complex adaptive systems, the study will be grounded in a complexity ontology. Complexity theory is an alternative to a deterministic Newtonian paradigm, and this has important implications for the research design. This section advocates the use of a complexity paradigm as an ontological and epistemological approach to understanding corporate sustainability.

3.2.1 Towards a complexity paradigm

Intractable problems such as climate change, sustainable development and corporate sustainability call into question the viability of underlying assumptions and paradigms that shape the conceptualisation of these problems. The need for a complexity paradigm is increasingly recognised in sustainability (Capra & Luisi, 2014; Chapman, 2013, 2016; Swilling & Annecke, 2012; Wells, 2013) and corporate sustainability literatures (Baets & Oldenboom, 2009; Gladwin et al., 1995; Hart, 1995; Shrivastava, 1994; Valente, 2012).

Awareness of assumptions helps to avoid “problem solving abilities being caged by the paradigms within which we operate” (Chapman, 2013). Periods of “revolutionary science”, Kuhn (1970) argues, are needed to disrupt “normal science” by challenging the conceptual

frameworks or scientific paradigms underpinning scientific theories. The challenges associated with sustainable development can be seen to be partially a consequence of the ways of thinking and knowing associated with the Newtonian paradigm (Baets & Oldenboom, 2009; Chapman, 2016; Meppem & Bourke, 1999; Wells, 2013). A Newtonian paradigm sought to grasp reality through understanding its components. Capra & Luisi (2014, p. 13) propose that the "zeitgeist ('spirit of the age') of the early twenty-first century is being shaped by a profound change of paradigms, characterized by a shift of metaphors from the world as a machine to the world as a network" (Capra & Luisi, 2014, p. 13). Morin (2008, p. 97) is less certain: "we are, perhaps, living through a great paradigm shift. Perhaps. It is difficult to determine with any certainty, since a great revolution in the principles of thinking takes a long time. It is, or it will be, a very slow, multiple, and difficult revolution".

The scientific revolution was extremely successful in advancing human civilisation. The heliocentric view of Copernicus, developed through Galileo's focus on material properties that could be quantified and Bacon's methods of scientific experimentation, shifted the scientific view of nature as organic to viewing it as a machine. Science became preoccupied with the domination and control of nature (Capra & Luisi, 2014). Descartes's introduction of the analytic method based on radical doubt created the foundations of the modern scientific method but also resulted in dualism and reductionism (Capra, 1983). Reductionism, also known as analysis, sought to understand complex phenomena by reduction to individual components, which resulted in a fundamentally materialist ontology (Heylighen, Cilliers, & Gershenson, 2007).

It was Newton, however, that succeeded in synthesising the works of Copernicus, Galileo, Bacon and Descartes into a mechanistic view of life, where the "machine world" comprised material particles that moved around in absolute space and time, governed by universal laws. As Capra and Luisi (2014, p. 28) point out, this mechanistic conception of the world was deterministic and underpinned by religious belief:

> "In the Newtonian view, God created in the beginning material particles, the forces between them, and the fundamental laws of motion. In this way the whole universe was set in motion, and it has continued to run ever since, like a machine, governed by immutable laws".

The interdependent and complex challenges of sustainable development in the globalised 21st century world cannot be achieved within the ontological and epistemological positions out of which the problems emerged (Meppem & Bourke, 1999). The Newtonian ontology is based on matter, absolute space and time, and forces which govern movement in space and time:

> "Ontologically, it reduces all phenomena to movements of independent, material particles governed by deterministic laws. Epistemologically, it holds the promise of complete, objective and certain knowledge of past and future" (Heylighen et al., 2007, p. 117).

Whilst there has been a domination of the Newtonian paradigm, the history of western science shows an ongoing tension with pendulum swings between the study of substance (matter) and form (patterns of relationship), a jostling between mechanism and holism (Capra & Luisi, 2014). This has occurred in various guises, as "debate between materialists and idealists, the empiricists and rationalists, Kantian philosophers and the logical positivists, and more recently, between positivists and postmodernists" (Chapman, 2013, p. 98).

Newtonian assumptions were brought into question through an interplay of advances in relativity; systems thinking; quantum mechanics; non-linear dynamics; chaos theory resulting in a shift back towards holism; and a revival of the Romantic philosophies which viewed earth as a living being (Capra & Luisi, 2014; Heylighen et al., 2007). This view, later to emerge as the Gaia theory (Lovelock & Margulis, 1974), provided normative implications for ecology:

> "The image of the earth as a living organism and nurturing mother served as a cultural constraint restricting the actions of human beings…As long as the earth was considered to be alive and sensitive, it could be considered a breach of human ethical behaviour to carry out destructive acts against it" (Merchant as quoted in Capra & Luisi, 2014, p. 25).

Holism, which predates complexity theory, was defined by Smuts (1927) as the tendency in nature to dynamically form wholes, where the whole is greater than the sum of its parts. Complexity theory emerged from the interaction between multiple disciplines such as mathematics, economics, biology, engineering, computer science (Chu et al., 2003) and from systems theory in an attempt to explain systems which have a multiplicity of potentials that can be actualised (Cilliers, 1998) through complex relationships and interdependencies (Mittleton-

Kelly, 2003). Complexity theory extends beyond the holism of systems theory. Complexity theorists critique the reductionist tendency in holism (Cilliers, 1998; Morin, 2008), in which "holism is a partial, one-dimensional, and simplifying vision of the whole" (Morin, 1992, p. 372). In this way reducing the whole to the characteristics of parts or reducing the characteristics of parts to the whole both simplify reality which can be more usefully characterised as a complex unity (Morin, 2008). This study regards the conceptualisation of a complex "unity in diversity" as fundamentally important and adopts this perspective. The use of the term "holism" in this dissertation denotes a view of corporate sustainability in which whole and part, and their interactions, are recognised as a complex unity. Understanding sustainability at the level of agent thus relies on an explanation of sustainability at the level of organisation and environment and vice versa.

The formalising and modelling of complexity, as developed by the Sante Fe Institute, a complexity institute in New Mexico, has been described by Morin (2008) as restricted complexity. Restricted complexity avoids the paradigmatic implications of complexity, thereby decomplexifying it (Cloete, 2017; Morin, 2006, 2008). Generalised complexity, unlike restricted complexity, abandons the quest for a unified theory of complexity and asserts that "complex phenomena are irreducible" (Woermann, 2011, p. 2). Generalised complexity is concerned with how knowledge is organised, thereby requiring an epistemological and ontological re-conceptualisation (Chapman, 2016; Heylighen et al., 2007; Morin, 2008).

In a complexity paradigm, external reality is comprised of immaterial interconnections (Heylighen et al., 2007) with no substantial external reality (Chapman, 2016). Reality appears as a process rather than as things (Chapman, 2016) and appears differently at different scales. The materiality of atoms and particles is apparent, but at a quantum level reality appears as immaterial patterns (Baets, 2009; Chapman, 2013). Heisenberg's uncertainty principle suggests that exact values cannot be simultaneously assigned to both the position and momentum of a physical system (Hilgevoord & Uffink, 2014). Non-locality in quantum mechanics has significant implications for an ontological position as it implies interaction beyond a fixed space-time, where there is entanglement between systems. Entanglement of quantum objects challenges common assumptions that ordinary objects are absolutely separate (Radin, 2006). The inseparability of quantum systems is important for the consideration of an ontological position, where the properties of entangled systems cannot be reduced to those of their parts (Lewis, 2016).

Quantum mechanics and complexity theory also have important epistemological implications; the observer is no longer afforded a privileged and detached "objective" point of view, as observers participate in reality as an interconnected immaterial whole (Chapman, 2016). This means that, other than the subjective past, there is no external reality to be discovered (Chapman, 2016). Instead the observer should strive towards a meta-perspective (Morin, 2008), whilst being cognisant of the system he or she is interacting with, thus maintaining a reflexive stance (Woermann & Cilliers, 2012). Morin (2008) proposes a co-constructivist epistemology based on complexity and quantum theories. Whereas a constructivist epistemology proposes that knowledge is generated through the interaction of ideas and experiences (von Glasersfeld, 1981), the construction of reality is co-determined by the people and the world they inhabit, as well as their socio-cultural and paradigmatic context (Morin, 2008).

Whilst a complexity ontology can be translated into a complexity epistemology in a research context, this distinction is not important from a complexity paradigm:

> "If epistemology is about what we know and how we know what we know – what is inside - and ontology is about what there is to know – what is outside – then the most fundamental challenge that complexity makes is that these can no longer be considered as separable" (Allen & Varga, 2007, pp. 19–20).

Similarly, Wilber (2012, p. 50) positions ontology and epistemology as "complementary aspects of the same occasion…(where) the structure of the subject co-creates the nature of the phenomena perceived". Allen and Varga (2007) propose circularity between ontology, epistemology and axiology, where values influence intention, which drives epistemological change. Conversely, epistemology is also influenced by experiences, produced as an individual acting within the constraints of ecosystems, translating intention into action. A critical complexity approach proposes complexity in both an ontological and epistemological sense in which the implications for the nature of reality and how we organise knowledge are reflexively considered (Woermann, 2010). This integration and approach provide a normative function (Woermann & Cilliers, 2012), which is a potentially useful position from which to approach corporate sustainability as a super-wicked problem.

Thus far, the complexity paradigm has been explored with reference to the mainstream Newtonian paradigm, as the domination of the Newtonian paradigm in the West has

contributed to the sustainability crisis (Chapman, 2013; Meppem & Bourke, 1999). Table 3.1 provides a comprehensive comparison between the Newtonian and complexity paradigms (Chapman, 2016, pp. 128–131).

Newtonian paradigm	**Complexity paradigm**
Reality is material and atomic.	Reality consists of immaterial, dynamic and nested patterns of relationship which form an interconnected whole. Patterns, which are persistent in time and space relative to the observer, appear substantial.
There is an objective reality that is separate from the observer.	Because reality is an interconnected whole, absolute objectivity is not possible. Entities that appear to be isolated on one scale/dimension are connected at others. Reality is subjective and observer dependent.
The arrow of time is reversible. All processes are deterministic and theoretically reversible.	The arrow of time is irreversible. Open systems spontaneously become irreducibly complex over time, and closed systems become irreversibly disordered.
Most natural systems behave linearly and predictably – small changes create small effects, and big changes create big effects.	Most natural systems behave non-linearly because they are coupled through feedback. Small changes can create big effects through positive feedback and sensitivity to initial conditions, and big changes can have little effect due to negative feedback.
Atomic reality reconfigures as the result of cause and effect – change is the result of external disturbance.	Reality is constantly emerging/being created through self-organisation. Change is internal, the result of perpetual self-creation.

Reality is reducible – wholes are equal to the sum of their parts.	Reality is irreducible. Wholes are greater than the sum of their parts. Self-organising systems spontaneously create higher order patterns that are qualitatively different from, and therefore cannot be explained by, the properties of their parts.
Reality is the product of upward causality; therefore, there can be no true novelty.	Reality is the product of upward and downward (circular) causality via self-organisation. Through emergence, each moment paradoxically has the capacity for infinite novelty while being simultaneously constrained by its spatial and temporal couplings.
History determines the future. The future is deterministic and predictable.	History constrains rather than determines the future. The future is uncertain, and predictability is probabilistic and scale dependent.
Chaos is equivalent to entropy; it is a measure of systems' randomness and disorder.	Chaos signals deep, underlying system order that appears as disorder because of the scale of observation. Chaos indicates the system is being observed at the point where it is vacillating between qualitatively different dimensions/logical levels.
Instability/chaos in ordered systems is caused by external disturbances.	Chaos is intrinsically embedded in order and vice versa. Chaos and order are co-extant and scale dependent.
Space and time are separate and absolute entities- they are the backdrop/container for the material universe and the immutable laws that govern it.	Space and time are unified in the fourth dimension as spacetime. Spacetime is not an absolute entity or backdrop to the universe. It is the scope of an emerging, self-organising universe. Laws of the universe are actually large-scale coherent patterns of the universe's self-creation.

Order, complexity, novelty evolve divergently as the result of natural selection.	Order, complexity and novelty emerge spontaneously through self-organisation, i.e. convergence of systems through coupling. Natural selection squashes, rather than creates, new order.
External reality is knowable. It is revealed to our senses and us through objective observation.	Reality is specified through our active participation. The reality we see is not the world, but a world we bring forth with others.

Table 3.1: A comparison between the Newtonian and complexity-based paradigms

Source: Chapman (2016, pp. 128–131)

Features of a complexity paradigm provide a useful way of considering the ontological and epistemological foundations of corporate sustainability. Whilst all the features warrant further discussion, this study will focus on emergent spacetime as a fundamental consideration.

3.2.2 Emergent spacetime

Moving from a Newtonian to a complexity paradigm requires a shift in thinking from perceiving reality as an unceasing rearrangement of energy, to seeing it as being continuously constructed. This approach is akin to process philosophy and pragmatism in which organisations, rather than being objectively "out there" in the world, can be "conceptualized as relatively stabilized relational configurations that have evolved as actualities out of an infinite number of possibilities" (Nayak & Chia, 2011, p. 282). Process metaphysics, as opposed to particle metaphysics, is useful in exploring ontological emergence (Bickhard, 2011). To use the analogy of the Greek philosopher Heraclitus, you can't step into the same river twice, as the waters are ever changing. "Process metaphysics accordingly stresses the need to regard physical things – material objects – as being no more than stability-waves in a sea of process" (Rescher, 1996, p. 53). Process metaphysics is consistent with quantum field theory, which has displaced the classical notion of particles, where quantum fields can be understood as processes (Bickhard, 2011).

From this perspective, the observer is no longer afforded objectivity but takes up an active role in co-creating reality, as enacted by the methods used to observe reality. As displayed in Figure 3.1, it is through the retroactive interaction between order, disorder and organisation that reality emerges:

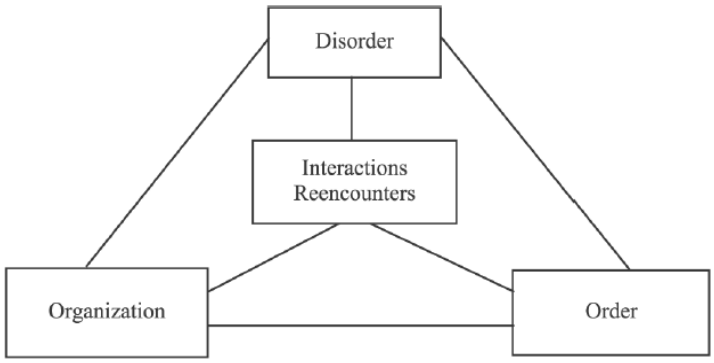

Figure 3.1: Retroactive principle

Source: Morin (adapted by Barin Cruz et al., 2006:876)

Some disorder allows for change and innovation, whilst some order allows for organisation, yet it is the retroactive interaction that enables an organisation to co-evolve with its environment (Morin, 2008). The interaction of the parts, systems and environment give rise to the emergent behaviour of the system (Cilliers, 1998).

Understanding the emergent nature of reality requires us to revisit our ontological position, shifting from thinking of reality as a pre-existing container to envisaging an emerging and unified spacetime (Bickhard, 2011; Chapman, 2013; Heylighen et al., 2007). This creates a radical shift from a focus on change to a creative participation in emergence. Chapman (2016, p. 112) suggests visualising this emergent space-time, the scope of the emerging reality, as a fourth dimension of a flattened three-dimensional Newtonian view of reality:

> "Grasping reality as emerging rather than changing requires a logical jump in how we think about time. Instead of thinking about time and space as separate entities (as per Newtonian classical mechanics), one must think of them as being unified in the fourth dimension as spacetime (as per Einstein's special relativity). In other words, it requires that we see time as integrated with space into a flow of events, rather than as a separate unrelated dimension".

Chapman (2016, pp. 116–117) provides a useful way of developing a sense of a unified four-dimensional spacetime by examining Figure 3.2 in which the objects appear to have no connection in either (a) or (b), or between (a) and (b).

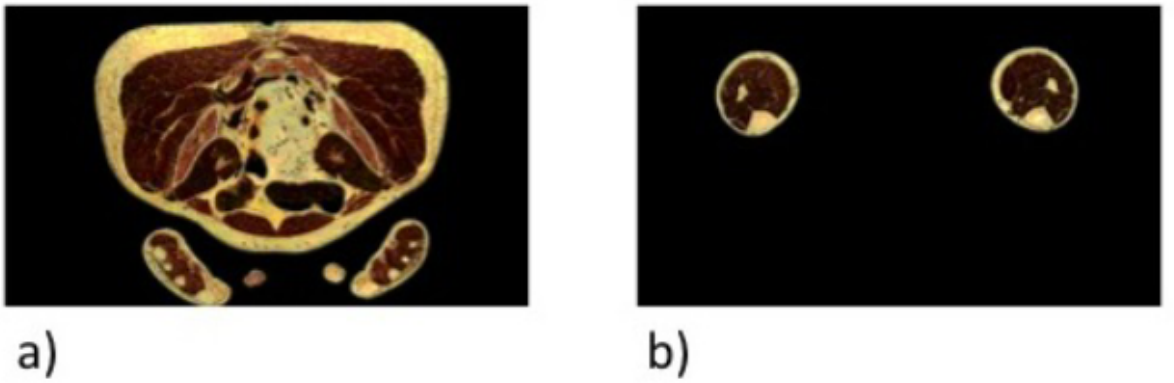

Figure 3.2: Objects without apparent connection

Source: Mad Sci Network in Chapman (2016, p. 116)

However, when examining Figure 3.3 the connection between the two-dimensional elements becomes apparent when they are stacked to reveal a three-dimensional human body. Viewing reality through a Newtonian paradigm is similar to attempting to grasp the three-dimensional form from the transverse section. Higher logical-order dimensions (three axes), cannot be inferred from the lower-order dimensions (two axes only) - it requires a jump in perception, which in turn would require an external view of reality (Chapman, 2016).

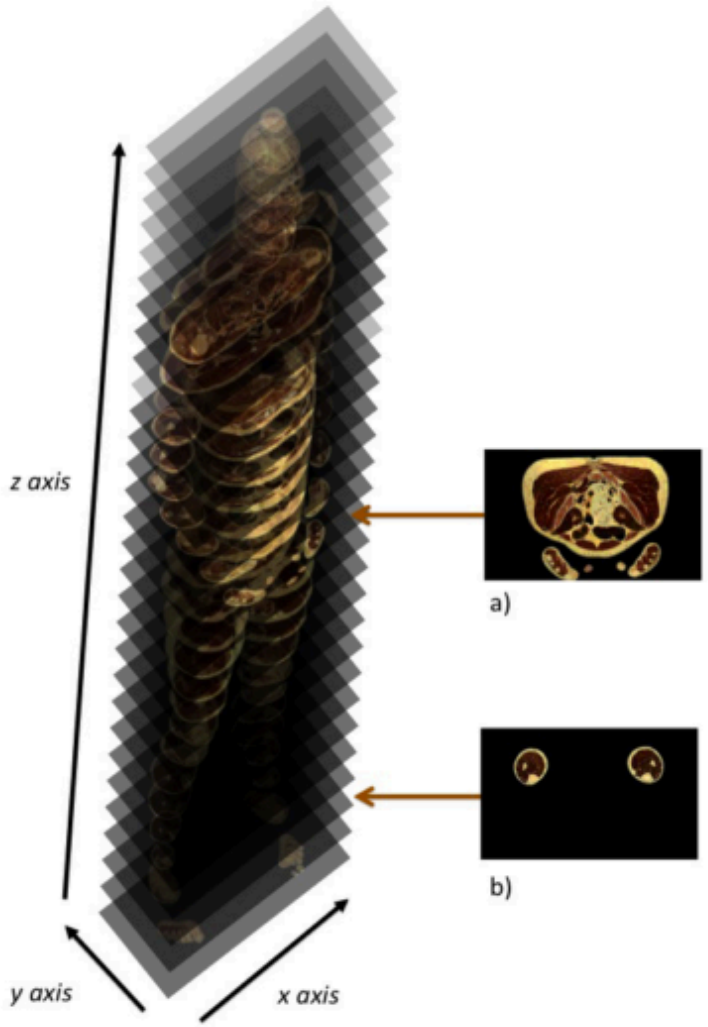

Figure 3.3: Two-dimensional transverse sections of human body stacked to reveal a three-dimensional body

Source: Mad Sci Network in Chapman (2016, p. 117)

Chapman (2013, p. 132) points out that it is the scale of human perception that creates difficulty in perceiving reality as process:

> "The scale at which we experience time causes us to perceive most things as existing and moving around in space, rather than emerging through self-creation. However, if we lived much, much longer, and our perception of time was radically sped up, before our eyes we would see all things—including animals, trees, forests, mountains, and planets—emerging and growing, then breaking down and disintegrating before rising up

again. This would help us understand reality as continuously emerging in a dynamic process of creative destruction, of oscillating order and disorder."

The notion of a unified spacetime is important in this study as it shifts attention away from managing change or adapting to the environment, towards the co-evolution of a corporate form functioning in coherence with its environment. Conceptualising corporate sustainability as an emergent process allows us to begin with an assumption that the transformation to a sustainable future is already underway, and to harness co-evolutionary processes and mine solutions that emerge through networks of agents acting at a local level. Approaching corporate sustainability in this way is vastly different to a linear process of managed change. It requires that agents self-organise by enacting a more productive ecological perspective. The argument thus needs to be developed further, as the phenomena of climate change which the corporate sustainability agenda addresses are diffuse and often distant from everyday perceptions.

3.2.3 Ontological and epistemological pluralism

Corporate sustainability as an emergent process requires that agents acting in complex systems sense phenomena sufficiently in order to co-evolve effectively with other systems and with the environment. The ontological and epistemological status of climate change can make this problematic. These issues will be discussed in this section and ontological and epistemological embodiment and enactment will be proposed as a way of addressing them.

The environment, alongside economic and social dimensions, is of central importance in corporate sustainability (Brundtland et al., 2012; Elkington, 2004). Climate change as the central phenomenon is difficult to perceive because of its ontological multiplicity and epistemological distance. This means that we run the risk of agents not recognising or acknowledging environmental thresholds (Millenium Ecosystem Assessment, 2005; von Weizsaecker & Wijkman, 2017). Climate change is an example of a phenomenon which is ontologically plural (Esbjörn-Hargens, 2010). It is made up of a multiplicity of interacting phenomena which can be understood in a vast number of ways; this often has much to do with the way in which the observer is seeking to understand the phenomenon. A climatologist comparing tree rings perceives cycles of drought, whereas a banker may see a declining

property market as partly due to a regional drought. The view of reality is enacted through the methodology employed to perceive, and interact with, reality.

Ontological pluralism goes beyond the singular pre-existent reality of the Newtonian paradigm (positivism) and relativism of Postmodernism in which multiple views are considered in a discontinuous manner; it embraces a view of reality as a multiplicity in which emergent spacetime results in reality as an interconnected multiplicity (Chapman, 2016; Esbjörn-Hargens, 2010), as depicted in Figure 3.4.

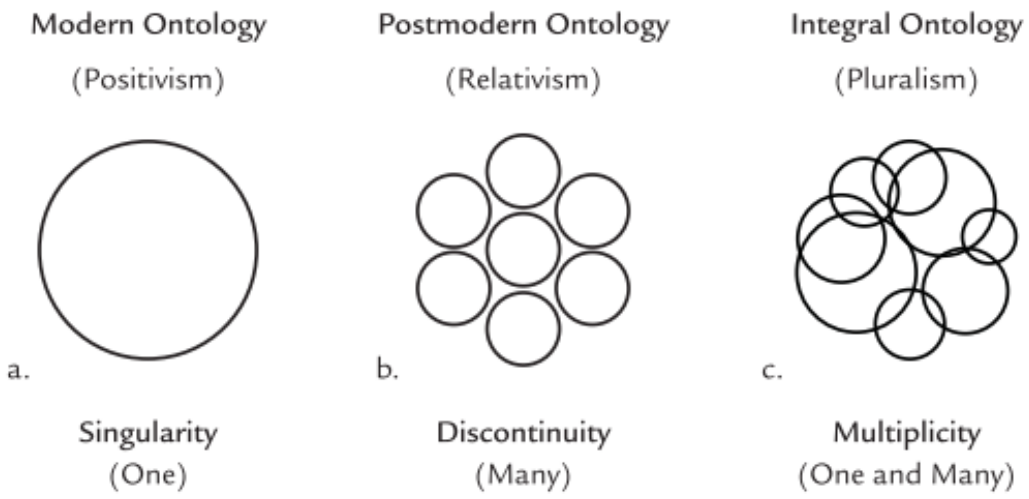

Figure 3.4: Ontological positions

Source: Esbjörn-Hargens (2010, p. 149)

The extent of ontological pluralism can be seen by revisiting Figures 2.1 and 2.2 in chapter 2. These charts show exponential growth indicators of climate change, ranging from increasing carbon in the atmosphere to plummeting fishing stock and rising levels of urbanisation. Figure 2.4 illustrates the interconnection of issues, displayed as trends and risks. Rich interconnections create a cascade of non-linear effects. The ontological multiplicity and interconnectivity have epistemological implications:

> "As we embark into the twenty-first century we enter into a world significantly different from that our ancestors entered into a century earlier: a world that is highly complex, differentiated, and with a degree of epistemological distance that has never been experienced before" (Carolan, 2004, p. 517).

Corporate sustainability and climate change can be hard to grasp as they can be epistemologically distant - some environmental problems “speak louder” than other problems (Carolan, 2004; Esbjörn-Hargens, 2010).

Carolan (2004) proposes a heuristic tool which maps environmental problems on two axes, epistemological distance and ontological complexity. Epistemological distance is the extent to which the phenomena can be perceived. First order state is when the phenomena can be directly seen such as litter or an oil spill, whereas phenomena in second order states, such as dioxin in the environment, can only be perceived through instruments. Phenomena in third order states can only be indirectly perceived through instruments, whereas climate change can only be grasped through multiple indicators. Whilst Carolan (2004) points out that both the ontological complexity and epistemological distance increase from first to third order, Esbjörn-Hargens (2010) extends the model by showing how the reality is enacted through multiple methodologies, as displayed in Figure 3.5. Methodological variety increases from first to third order states.

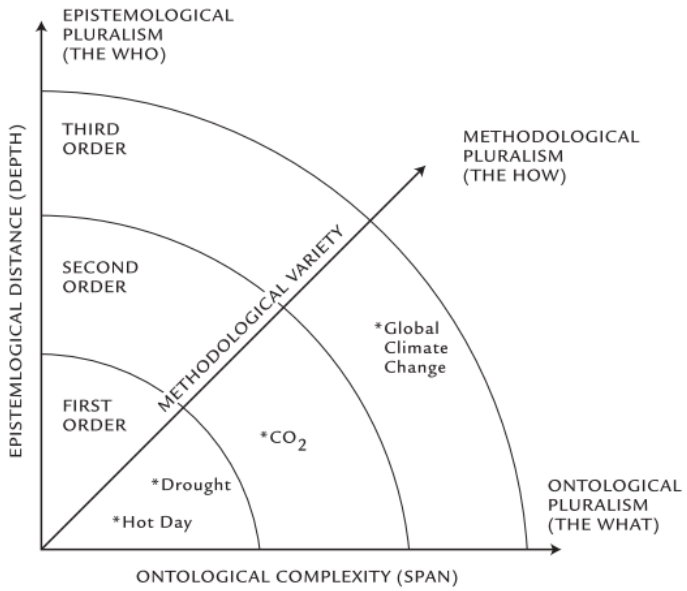

Figure 3.5: Integral pluralism and climate change

Source: Esbjörn-Hargens (2010, p. 161)

Figure 3.5 depicts the interaction between ontology, epistemology and methodology. It points to substantial challenges in corporate sustainability, since co-evolution requires that agents are able to "see" the problem. If ontologically complex phenomena are recognised, the variety of methodologies needed to grasp the problem are likely to result in substantial challenges.

The need for methodological pluralism to understand complexity is highlighted by Prigogine and Stengers (1984) who propose a synthesis of deterministic Newtonian physics and probabilistic quantum physics, in which reality as interconnected processes as opposed to separate phenomena. The implementation of this in the mixed method design of this study will be discussed in section 3.3.

The next section will respond to the challenges associated with the epistemological distance of climate change and corporate sustainability through the notions of cognitive embodiment and enactment.

3.2.4 Epistemological embodiment and enactment

The challenges associated with epistemological distance can be understood by the notions of embodied cognition (Lakoff & Johnson, 1999) and enacted cognition (Varela et al., 1991). As discussed, a complexity-based epistemology involves observers as participants co-creating an interconnected immaterial reality. Unlike a Newtonian view in which observers process information to grasp an external reality (mind as computer), cognition becomes an active process of relating between organism and environment (Chapman, 2016).

Lakoff and Johnson (1999) make three central claims of cognitive science, namely that (i) the mind is embodied, (ii) most thought is unconscious, and (iii) abstract concepts are largely metaphorical in nature. This approach is in keeping with the complexity paradigm in that it counters Cartesian dualism which sought to separate mind and body, and considers how cognition is situated in organism and environment:

> "According to the embodied perspective, cognition is situated in the interaction of body and world, dynamic bodily processes such as motor activity can be part of reasoning processes, and offline cognition is body-based too. Finally embodiment assumes that cognition evolved for action, and because of this, perception and action are not

separate systems, but are inextricably linked to each other and to cognition" (Hutchins, 2010, p. 428).

Embodiment of mind therefore acknowledges that thinking is an interactive process between the brain, the whole body and its environment, most of which occurs below conscious awareness (Lakoff & Johnson, 1999). Abstract concepts are seen to be largely metaphoric, mediated by unconscious and embodied experiences and starting during infancy. An example Lakoff and Johnson (1999) use is that of a mother holding a child, with the child experiencing physical warmth and affection. As this experience is repeated over time, connections develop between the domains in the brain perceiving warmth and those perceiving affection; the neural connection that eventually forms is that of the primary metaphor.

This example stands in stark contrast to the epistemological distance of many complex phenomena associated with corporate sustainability, where there is often limited experience of the phenomena. Abstract concepts pertaining to climate change and corporate sustainability are less likely to be coherent with metaphors that have been embodied through direct experience, and the metaphor of growth that is foundational to economic thinking is at odds with sustainable development (Baets & Oldenboom, 2009; Peter & Swilling, 2014; von Weizsaecker & Wijkman, 2017). Embodiment therefore becomes a potentially useful device when addressing the ontological and epistemological framework for this study.

Varela, Thompson and Rosch (1991) extend the notion of embodiment to include both sensorimotor capacities within the body and the embedding of these capacities in biological, psychological and cultural contexts. Experience and knowledge of reality occur through an embodied engagement with the environment and coupling of the brain, body and environment (Chapman, 2016). Embodied cognition is developed by embodied action, as the agent "lays down a path in walking" (Varela et al., 1991). Chapman (2016) argues that the interaction-centred nature of these approaches, involving cognition, body and environment, is consistent with a complexity ontology. Reality is ontologically enacted through social practice (Esbjörn-Hargens, 2010). Thus, as was argued previously, the ontological status of an object is determined by the manner in which it is enacted.

Similarly, Law and Urry (2004, p. 395) argue that scientific methods are performative in socio-cultural domains, where they "produce reality". This view is coherent with the notion of reality being continuously constructed in unified spacetime. This construction becomes increasingly

multiple as methodological variety increases with the ontological complexity and epistemological distance of the phenomena being studied. The next section will describe and justify the research design employed in the study.

3.3 Research design

This section will provide the rationale for the use of a mixed methods explanatory sequential design to address the research questions and objectives presented in Table 3.2. The value of mixed methods in the context of complexity is considered, and the use of a multiple case study design discussed. The quantitative and qualitative strands of the research are then described.

No.	Research question	Research objective
1.	How does sustainability emerge in financial institutions?	To understand the process of emergence of sustainability in financial institutions.
2.	What is the role of coherence in the emergence of sustainability?	To describe the role of coherence in enabling the emergence of sustainability.
3.	What conditions enable the emergence of sustainability?	To design a framework for the development of conditions that enable the emergence of sustainability.

Table 3.2: Research questions and objectives

3.3.1 Rationale for a mixed methods design

Complex phenomena such as corporate sustainability and climate change are ontologically plural and can be epistemologically distant and therefore difficult to grasp (Esbjörn-Hargens, 2010). As discussed in the previous section, this highlights the need for methodological pluralism (Esbjörn-Hargens, 2010; Mertens, 2015) in research design.

Since methods are performative and produce reality (Law & Urry, 2004), they can be seen to affect the ontological enactment where phenomena such as corporate sustainability and climate change can be considered as a “multiple object with overlapping and divergent

dimensions" (Esbjörn-Hargens, 2010, p. 143). The more multiple the ontological status, the more transdisciplinary and methodological plurality is needed to make sense of the phenomenon being studied (Esbjörn-Hargens, 2010; Law & Urry, 2004; Wells, 2013). There is thus a necessary interaction between ontology, epistemology and methodology:

> "The move here is to say that reality is a relational effect. It is produced and stabilized in interaction that is simultaneously material and social. Heisenberg wrote about a version of this problem in physics: 'What we observe is not nature itself, but nature exposed to our method of questioning.' There is little difference between physics and social science here: theories and methods are protocols for modes of questioning or interacting which also produce realities as they interact with other kinds of interactions" (Law & Urry, 2004, p. 395).

Mixed methods provide a substantial advantage in that they enable multiple enactments of reality (Esbjörn-Hargens, 2010), thereby illuminating more facets of the phenomenon under investigation. Furthermore, mixed methods are advantageous when either quantitative or qualitative data cannot adequately address the research problem (Axinn & Pearce, 2006; Creswell & Plano Clark, 2010).

Mixed methods are useful for researching wicked problems, arising from multiple interacting systems characterised by high levels of social and institutional uncertainty (Mertens, 2015). This is particularly important in the context of corporate sustainability and climate change which are considered to be super-wicked (Levin et al., 2012). One of the characteristics that differentiates super-wicked from wicked problems is that those trying to resolve the problem are also contributing to causing it (Levin et al., 2012). Reflexivity in the research process becomes important on account of this, particularly when considered alongside the performative nature of methods:

> "Reflexivity (as opposed to reflection) is an even more-difficult affair. It involves seeing the interrelationships between the sets of assumptions, biases, and perspectives that underpin different facets of the research we undertake" (Weber, 2003, p. xi).

Whilst reflexivity is important to research design, it is also important when considering research as an emergent rather than a linear process:

> "Method is a matter of critical self-reflection aiming to constantly challenge the assumptions that frame the progression – and regression – of the inquiry, considering the researcher's experience and the conditions framing knowledge production. Method therefore is an emergence that can be conceived as experiential learning" (Alhadeff-Jones, 2013, p. 24).

Research in the context of wicked and super-wicked problems acknowledges that there are no completely right solutions, but rather better or worse solutions (Mertens, 2015). Determining the relative value can be supported through allowing for multiple stakeholder interpretations of the data. An explanatory sequential design achieves this and is discussed in the next section.

3.3.2 Explanatory sequential mixed methods design

Since the research aimed to understand emergence as a process in corporate sustainability and describe the role of coherence, it was important to implement a holistic sustainability measure of a firm in order to provide a way in which the level of coherence could be determined. An initial quantitative strand in the research design was therefore required. Since corporate sustainability is ontologically plural, it was useful to employ multiple methods. A second qualitative strand was implemented to allow for multiple stakeholders from different functional areas and levels in the businesses to reflect on, and collaboratively interpret, the quantitative dataset. As discussed previously, mixed method designs have the advantage of enabling the researcher to retain the complexity of the phenomena within the study (Morse, 2010).

A mixed method, explanatory sequential design (Creswell, 2015) was thus employed, as displayed in Figure 3.6. This research design involves first collecting and analysing a quantitative data strand and then using a qualitative strand to explain the quantitative results (Creswell, 2015). The quantitative and qualitative data are thus analysed separately, and the quantitative results inform the planning of the qualitative strand (Creswell, 2014).

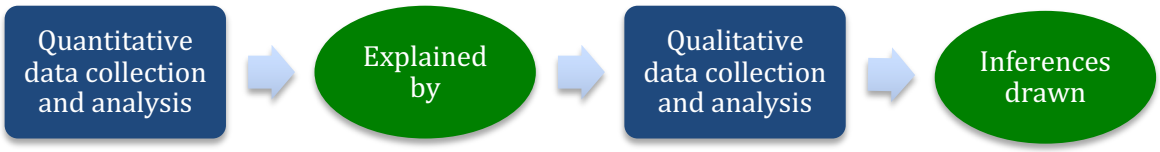

Figure 3.6: Explanatory sequential design

Source: Creswell (2015, p. 39)

Whilst offering many advantages, mixed method research is often criticised for inadequate integration of data (Bryman, 2006; Greene, Caracelli, & Graham, 1989). Integration requires a coherent ontology, as well as a means whereby the data can be systematically integrated and the findings linked (Bryman, 2006). A complexity ontology provides a useful framework due to the circularity of ontology, epistemology and methodology within this paradigm (Allen & Varga, 2007; Wilber, 2012; Woermann, 2010). The integration of quantitative and qualitative data was achieved through a participatory process which is in keeping with a co-constructivist epistemology (Morin, 2008), in that interviews provided an opportunity for diverse stakeholders to construct a narrative in interpreting the quantitative data. This also served to reduce the epistemological distance of the more aggregated quantitative dataset. Additional strategies that were employed to support data integration in the study are discussed in the next section.

Since emergence is more visible when viewed longitudinally, as it is characterised by "recognisable, repeating features or patterns" (Holland, 1997, p. 15), a six-month gap was allowed between the implementation of the survey and interviews. This would introduce a longitudinal aspect to a largely a cross-sectional study. Interviewees were thus able to interpret and reflect on the quantitative data retrospectively.

3.3.3 Multiple case study design

The research follows a multiple case study design; one case is embedded, including both the holding company and subsidiaries. As characteristic of an embedded case study, multiple levels of analysis were employed (Eisenhardt, 1989; Yin, 2014). One level of analysis was at the level of entity and comparison between entities. The other level of analysis was at the level of subsidiary and analysis of the relationship with the holding company.

The unit of analysis was the firm, since the focus of the study was corporate sustainability. Case study research is useful when boundaries between phenomenon and context are indistinct, and thus it is preferable to study the phenomenon within its context (Yin, 2014). The complexity paradigm, as well as the corporate sustainability focus, meant that it was important to consider the firm as embedded in multiple containing systems, since interaction between and across multiple levels of system is central to corporate sustainability (Baets & Oldenboom, 2009; Chapman, 2016; Espinosa & Walker, 2011; Peter & Swilling, 2014; Wells, 2013). It was important that the research design emphasised contextuality. The ability of case study methodology to deliver contextual knowledge is a key advantage (Flyvbjerg, 2006; Stake, 2006; Yin, 2014), whereas:

> "Great distance to the object of study and lack of feedback easily lead to a stultified learning process, which in research can lead to ritual academic blind alleys, where the effect and usefulness of research becomes unclear and untested. As a research method, the case study can be an effective remedy against this tendency" (Flyvbjerg, 2006, p. 6).

The contextuality of knowledge is important when studying complex systems which are dynamical in nature and display ontological plurality, therefore needing contextual descriptions:

> "The remarkable feature is that when we move from equilibrium to far-from equilibrium conditions, we move away from the repetitive and the universal to the specific and the unique" (Prigogine & Stengers, 1984).

The urgency of addressing corporate sustainability and climate change as super-wicked problems (Mertens, 2015) necessitates an instrumentalist agenda in research. Another advantage of a case study approach is that it allows for contextually relevant research outputs that can assist in enhancing the corporate sustainability initiatives of the cases and similar institutions (Yin, 2014). Case studies have been widely criticised for a lack of generalisability (Flyvbjerg, 2006) - single case studies "involve the error of misplaced precision" and lack a means of comparing the data results in the studies, having "such a total absence of control as to be of almost no scientific value" (Campbell & Stanley, 1963, p. 6).[3] However, the ontological

[3] Note that Campbell in his later work revised this view in support of the use of case studies.

status of social phenomena and complexities associated with socio-economic and environmental phenomena (Baets & Oldenboom, 2009; Chapman, 2013; Wells, 2013) make rich, context-specific knowledge important (Chapman, 2016; Geertz, 1973). Analytic generalisation theory can be used to generalise from case studies (Eisenhardt, 1989; Scapens, 1992; Stake, 2006; Yin, 2014).

A multiple case study design was selected to facilitate a comparison between the process of emergence across two organisations, and between an organisation and its subsidiary. This served to explicate key processes, conditions and patterns of coherence (i) within each organisational setting and (ii) from interactions between a firm and its subsidiaries. Stake (2006) recommends that a minimum of four cases are selected to ensure sufficient interactivity between programmes and situations when conducting multiple-case study research. This was achieved through comparisons between two local cases together with comparisons between three international cases.

Firm selection

The firms were selected using a paradigmatic case sampling method, a form of purposive sampling (Palys, 2008) where a case is selected as an exemplar of a particular class of phenomenon. The sampling process was commenced in South Africa and then extended to Namibia. Since the research design required a survey to be rolled out across the entire population of managers, the study required a substantial commitment of time, which made gaining access challenging. By selecting multiple cases and an embedded case the researcher was able to both compare multiple firms and explore how emergent processes differed across parent company and subsidiary.

A large Namibian financial services group, with subsidiaries in Botswana and Zambia, was selected due to having actively introduced organisational development initiatives explicitly based on a complexity paradigm[4]. These initiatives were sponsored at the highest level in the organisation and had been implemented prior to the research being conducted. The

[4] Complexity-based organisational development initiatives were based on the work of Laloux (2014). This was characterised as an exemplar due to the complexity approach adopted and explicit application of these methods to the area of corporate sustainability.

complexity initiative had resulted in the integration of sustainability into the business strategy and in a comprehensive culture change initiative with participation across the business. This provided an excellent context in which to study emergence in corporate sustainability.

Another firm selected is a subsidiary of a South African financial services group with a regional footprint, which is considered an exemplar for corporate sustainability, as evidenced by multiple sustainability awards and achievements, as well as featuring in case studies in international publications[5]. It has a history in South Africa of progressive corporate responsibility initiatives spanning several decades. Attempts to gain research access to the holding company were unsuccessful, limiting the research to the group's Namibian subsidiary. It was of interest to consider the subsidiary of a group which is widely recognised for sustainability practices in South Africa.

The Namibian holding company was studied at the levels of holding company and subsidiary, whilst the subsidiary of the South African financial services organisation was only studied at the level of the subsidiary. This provided the opportunity for the perspectives of both the holding company and subsidiary to be considered in the research. The study thus has the features of both an embedded case and multiple case design.

Research ethics

The research design and implementation were guided by the University of Cape Town Commerce Faculty Ethics in Research Policy. This involved ethical permissions from each organisation, as well as employees participating in the quantitative and qualitative data collection. Organisational permission was negotiated through an executive sponsor at each firm, as recommended by Creswell and Plato Clark (2010), and non-disclosure agreements to protect the anonymity of data and to ensure that trade secrets and sensitive commercial information were protected were signed by the researcher. Participants in both the quantitative and qualitative strands of the research received advance written communication in which the

[5] To protect the anonymity of the organisation, the publications are not cited. In 2017, the Group, which is headquartered in South Africa, was included in the FTSE4Good Index and Dow Jones World Sustainability Index and achieved an "A" for performance on the South African Carbon Disclosure Project Index.

background to the research, the expectations from participants and the ethical considerations were outlined. Consent for participation was obtained electronically in the online survey, and a letter of consent was signed by each interviewee. Anonymity of data was assured through rigorous research protocols pertaining to secure handling and disposal of research data. Approvals for the research protocol were given by the Commerce Faculty in Research Committee of the University of Cape Town on the 4th of April 2016.

3.4 Research methods

In this section the research methods used in each strand of the research design are explained. The procedure for implementation and method of analysis of the Cassandra survey are presented, and the narrative interview and data analysis approach discussed.

3.4.1 Quantitative strand

The initial phase of an explanatory sequential design involves the collection and analysis of a quantitative dataset (Creswell, 2015). In the quantitative strand, a holistic measure of each business was analysed using artificial neural networks to identify clusters of respondents that had similar views and to provide a means of determining levels of coherence between the various clusters. The procedures followed will be unpacked in this section.

Sampling procedure

The entire population of managers from junior to executive management in each entity was included. The sampling frame was confined to management due to the complexity of items in the survey and the need for access to sufficient information on the business to make an informed rating on items. As Babbie (2010) points out, sampling frames are simple in organisations as there is a membership list which constitutes an excellent basis for a sampling frame. Respondents needed to be employees of the business holding a management position as defined in the organogram of each organisation. This decision was made in consultation with the executive sponsors, business intelligence heads and human resource practitioners for each case. The entire population could be included as the survey was distributed online; this

had the benefit of the widest possible representation of views, as well as serving to enhance the size of the quantitative dataset.

Obtaining permissions

Employees were invited to participate in the survey with a letter of invitation and informed consent form which outlined the requirements for participation and ethical considerations (Appendix A). This letter was distributed with a covering message from the executive sponsor which served to confirm organisational permissions and encouraged participation by contextualising the benefits of the study for the business.

Cassandra survey

The Cassandra survey, a holistic diagnostic for sustainable performance (Baets & Oldenboom, 2009), was implemented. This survey was chosen as it constitutes a complexity paradigm and the definition of sustainable performance fits with fourth wave (Promethean) corporate sustainability:

> "Sustainable performance is corporate (or organisational) performance that seeks a dynamic equilibrium in the processes of interaction between a company, the carrying capacity of its stakeholders, and the environment in such a way that the company develops to express its full potential without adversely and irreversibly affecting the carrying capacity of the stakeholders and the environment on which it depends" (Baets & Oldenboom, 2009, p. 143).

The holistic nature of the assessment is achieved through an integral Q approach (Cacioppe & Edwards, 2005), covering all four integral quadrants (Wilber, 2001) as indicated in Figure 3.7. This approach ensures that both interior and exterior aspects of the phenomenon are considered alongside the individual and collective/networked aspects. This was necessary to be consistent with the embodied and enacted epistemological position adopted in the study. The Cassandra survey consists of items for each axis which comprise statements rated on a Likert scale (Appendix B) and includes a demographic section.

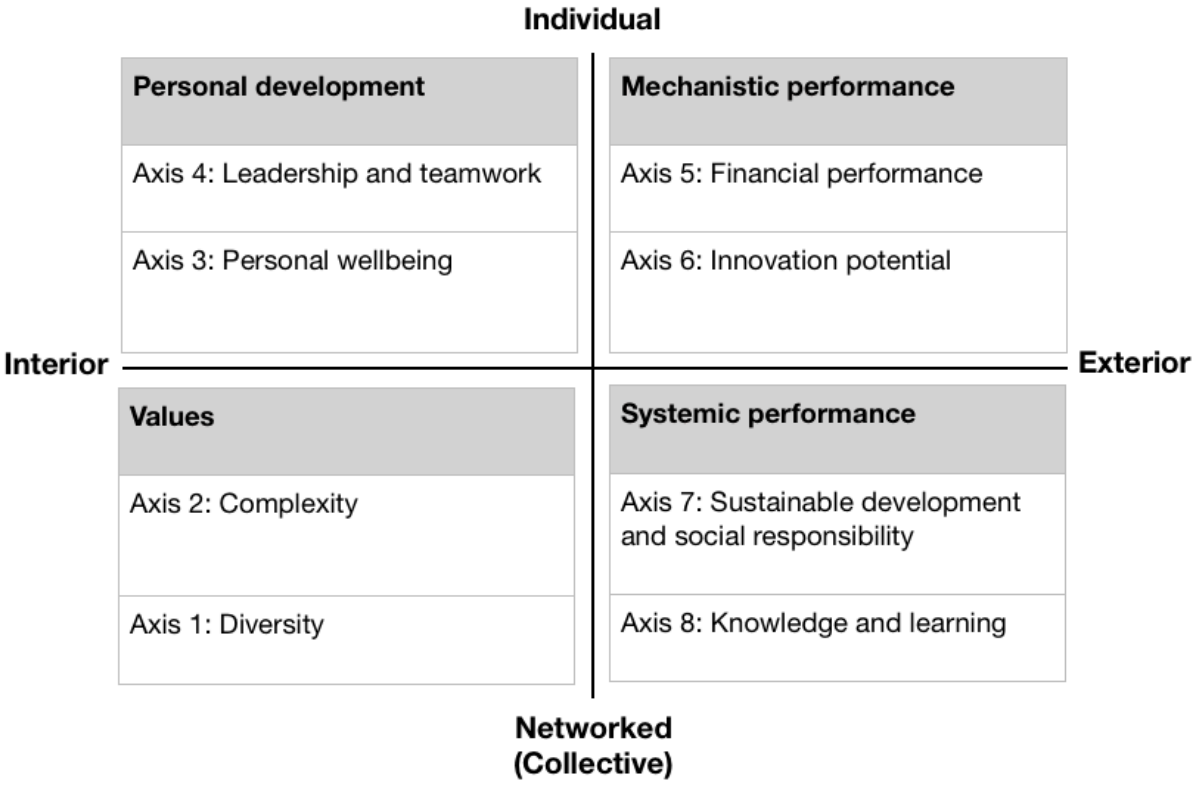

Figure 3.7: Cassandra axes

Source: Adapted from Baets and Oldenboom (2009, p. 146)

Contextualisation of the survey

Minor adjustments were made to enhance comprehension by the target population. This was deemed important as it was the first time the survey was implemented in Namibia, Botswana and Zambia. The use of technical or unfamiliar terms in survey items can result in the respondent needing to seek clarification, not answering or guessing, all of which reduce the reliability of the measurement (Fowler & Cosenza, 2008). Items were carefully scrutinised for ease of comprehension and for use of technical terms that were not common parlance in the population being studied.

Whilst adjustments were minor, additional background testing was done to ensure that the theoretical structure had been retained in the target population. Purposive sampling was used to select a range of respondents with experience across different functional disciplines and

levels of seniority. The sample comprised 10 recognised experts covering academics, consulting, senior and executive managers and specialists. It included an academic and consultant who specialised in integral theory; their perspectives were important for checking revisions within the context of the overall integral framework of the Cassandra survey. Respondents first completed the online survey and then participated in a semi-structured interview to ascertain whether their understanding of the revised items was consistent with the original wording of items. This was used to further refine the language use. A pilot study was then implemented within a Namibian financial services organisation, but the sample size was insufficient to conduct further testing[6].

Since the revisions were minor and the instrument had previously been validated (Baets & Oldenboom, 2009), the survey was fully implemented. To ensure that the theoretical structure of the model was retained and the construct validity wasn't affected, a confirmatory factor analysis was conducted on the full implementation of the survey. The results showed a good fit between the theoretical model and observations; they are discussed in the section on validity and reliability later in the chapter.

[6] The pilot study was implemented in 2016, and a sample of 94 was achieved. A principal component analysis (PCA) was attempted; however, the results showed that the correlation matrix was not positive definite, indicating that some of the eigenvalues were zero or near zero. The determinant of the matrix was essentially zero. These issues might have been caused by the small sample size. Hatcher (1994) recommends a sample size which is five times greater than the number of variables. The sample size was only marginally larger (N=94) than the number of items (N=72) on the instrument. The output of the PCA could thus not be used to draw meaningful conclusions about the dataset.

Data collection procedures

The survey was administered in 2017 through the SurveyMonkey platform. The survey was whitelisted to minimise access issues due to firewalls. Respondents were linked to an information technology professional for technical support and supplied with the researcher's contact information for support relating to completion of the survey. Implementation of the survey was largely successful, with only minor technical issues arising infrequently. A regular schedule of reminders was implemented. Care was taken to ensure reminders were positively framed and linked to the brand positioning of each company. The initial invitation to participate in the survey included a message from the executive sponsor, which together with the communication strategy was successful in motivating employees to respond. Across both cases, the average response rate was 44.45%, which is very successful given that the instrument comprised 72 items to be rated, as well as demographic questions.

Data analysis

The quantitative dataset was analysed using artificial neural networks (ANN). ANNs are pattern recognition algorithms which were originally developed as theories of information processing activities of biological nerve cells, such as the interconnected neurons in the neural networks of the brain (Baets, Brunenberg, & van Wezel, 1998; Scarborough & Somers, 2006). Internal representations of the external world are formed in response to exposure to stimuli as represented by the sample data (Scarborough & Somers, 2006). The network "learns" through multiple exposure to the sample data, where "structural elements of the network are reconfigured to approximate distributions, associations and other features in the data" (Scarborough & Somers, 2006, p. 12). Processing of data, as in the human brain, is distributed across the network (Baets et al., 1998). Cilliers (1998) advocates the use of "distributed" approaches to modelling the characteristics of complex systems. ANNs, as a connectionist model, is one such approach:

> "It is perhaps true that neural nets are particularly suitable because of their great flexibility, and this consideration has influenced the choice to use them as a paradigm example of distributed models" (Cilliers, 1998, p. 25).

ANNs, which follow a connectionist approach, are well suited to studying complex phenomena such as organisations. ANNs modelled on the human brain operate as a dense network of agents (neurons) (Baets et al., 1998; Baets & Oldenboom, 2009; Scarborough & Somers, 2006; Varela et al., 1991). Cilliers (1998, p. 25) suggests three reasons why ANNs represent a useful way of modelling complex systems:

- The complexity of systems is conserved as the ANN is constituted of complex structures.
- Information about their environment is encoded by ANNs in a distributed form.
- ANNs have the capacity to self-organise their internal structure.

This results in key advantages over conventional analysis, in that "neural model development is relatively unconstrained by researcher expectations compared with the defined parameters of anticipated functional relationships inherent to hypothesis testing" (Scarborough & Somers, 2006, p. 13). The output and structure of ANNs can thus be used to draw inferences about the characteristics of the data, such as interactions and non-linearities (Scarborough & Somers, 2006). This is useful in complex systems where it is difficult to predict these interactions and characteristics.

In order to identify clusters in the dataset, self-organising (feature) maps (SOMs) were implemented using the Kohonen package in R. SOMs are used to visualise similarity relations in a dataset (Kohonen, 2014). SOMs, a type of ANN, are classified as a non-linear unsupervised feedforward network (Scarborough & Somers, 2006). Unsupervised neural networks cluster similar items based on similarities within a set of variables, thereby "learning similarities among cases in a profile" (Scarborough & Somers, 2006, p. 68). The data run through the pattern algorithm many times (epochs), and similar cases are assigned to the same neurons and revised through multiple epochs where neurons with similar profiles are arranged together to form "globally ordered maps of various sensory features onto a layered neural network" (Kohonen, 1997, p. 69). This results in a topographical structure which is typically displayed as a heatmap.

Whilst the use of SOMs is still somewhat unusual in organisational behaviour research, Scarborough and Somers (2006) propose that SOMs have the potential to extract patterns in

data not easily uncovered by conventional multivariate statistical methods. This is particularly important in complex adaptive systems such as organisational systems in which rich interconnections (Baets, 2009; Chapman, 2016; Wells, 2013) can result in clusters that are often hidden in groupings generated by conventional statistics (Scarborough & Somers, 2006). This was tested in an organisational context by the same authors; k-means clustering was less sensitive when compared with SOMs. SOMs have been shown to be useful in organisational settings such as studying segmenting green consumer behaviour (Mostafa, 2009), organisational commitment (Scarborough & Somers, 2006), consciousness in organisations (Naidu, 2011), and the modelling of motivation in organisations (Jaquet, 2012).

ANNs are thus suited to studying complex adaptive systems and are aligned with a complexity paradigm (Baets & Oldenboom, 2009; Baets et al., 2016; Cilliers, 1998; Kohonen, 2014; Scarborough & Somers, 2006; Venugopal & Baets, 1994). The data analysis procedures for the implementation of the SOMs for each case are presented in chapters 4 and 5.

Construct validity of the Cassandra survey

The validity of a study indicates the extent to which it accurately measures the concept it intends to measure (Babbie, 2010). The Cassandra survey has been construct validated (Baets & Oldenboom, 2009). Construct validity considers the logical relationships amongst variables (Babbie, 2010). As it is based on a complexity paradigm, Baets and Oldenboom (2009) acknowledge that Cassandra does not fit the statistical conditions of a reductionist approach.

The original construct validation of the Cassandra survey was done using a factor analysis. A correlation matrix was built for each construct, and then was tested using Bartlett's sphericity test and the Kaiser Meyer-Olkin (KMO) test (Baets & Oldenboom, 2009). The results of the Bartlett's sphericity test showed that a factor analysis was a suitable approach. The KMO test indicates the proportion of variance in the variables that may be caused by underlying factors (IBM, 2018). The results for all constructs except complexity were above the error level of 0.05 of significance, indicating the adequacy of all the constructs except the complexity construct (Baets & Oldenboom, 2009). Whilst Baets and Oldenboom (2009) continue to use the current complexity axis, they do suggest value in the revision of this construct. Inspection of items showed that the language used was complicated; this was addressed by improving the understandability of items as described earlier in the chapter.

A factor analysis was applied to the main components, considering total variance and seeking the minimum number of factors to represent the data. The factor analysis confirmed the current set of eight constructs (Baets & Oldenboom, 2009).

Further testing of the reliability and validity of the Cassandra survey

Although there were only minor revisions, background tests were conducted to monitor the performance of Cassandra within the target population, ensuring that the theoretical structure was maintained.

Cassandra was tested for internal consistency using Cronbach's alpha, which shows how closely a set of items in a scale are related. The values are displayed in Table 3.3. All the values exceed the 0.7 threshold used in the social sciences (UCLA Institute for Digital Research and Education, 2018). The overall average across both cases is 0.9013, indicating an acceptable level of reliability.

Axis	**Case A: Cronbach's alpha**	**Case B: Cronbach's alpha**	**No. of items**
Diversity	0.8776	0.9171	9
Complexity	0.8829	0.9095	7
Personal wellbeing	0.8928	0.9129	9
Leadership and teamwork	0.8949	0.8985	9
Financial performance	0.9189	0.8767	5
Innovation potential	0.9081	0.9102	7
Sustainability and social responsibility	0.9090	0.9231	15
Knowledge and learning	0.8921	0.8968	11
Total scale	**0.8970**	**0.9056**	**72**

Table 3.3: Cronbach's alpha

A confirmatory factor analysis was conducted to test whether the structure in the data fitted with the theoretical structure of the instrument. The CFA was implemented for each case in R using the Lavaan package. A full information robust maximum likelihood estimator (MLR), a method of estimating parameters of a statistical model with respect to observations, was used as it allows for inclusion of missing data and is robust to non-normality in the data (Kline, 2005). Since the Cassandra survey had already been construct validated, a confirmatory approach was used to assess the revised model for goodness-of-fit.

Since the Cassandra instrument is based on a complexity paradigm it doesn't fit with the statistical conditions of a reductionist approach (Baets & Oldenboom, 2009), and a factor analysis is based on the assumption of a "linear relationship between the factors and the variables when computing the correlations" (Gorsuch in Yong & Pearce, 2013, p. 80). This is not the case with complex systems which by definition have non-linear interactions between elements (Baets, 2006; Chapman, 2016; Cilliers, 1998; Wells, 2013). It was, however, still deemed important to investigate the construct validity of the model to ensure that the instrument performed in the target population.

A sample size of 300 or more is recommended for CFA (Tabachnick & Fidell, 2006). Case A has 434 observations which is well beyond the minimum sample size, but it should be noted that Case B falls below the minimum limit with only 177 observations. A path diagram was developed for the Cassandra model, which is displayed in Appendix C.

The maximum likelihood factor extraction technique was implemented. The differences between the observed and estimated covariance matrices were evaluated for goodness-of-fit. An absolute fit index was used, which shows how well an a priori model reproduces the sample data (Hu & Bentler, 1999). Absolute fit measures provide "the most fundamental indication of how the proposed theory fits the data" (Hooper, Coughlan, & Mullen, 2008, p. 53), and this was the aim of the re-testing of the instrument.

Due to the complexity of the instrument and sample size, the root mean squared error of approximation index (RMSEA) was selected as it tests the null hypothesis for a "close fit" rather than an exact fit (Browne & Cudeck, 1989), thereby making allowances to some extent for the dynamic interconnected nature of complex adaptive systems. Whilst RMSEA values of ≤ 0.05 can be considered a good fit, values between 0.05 and 0.08 can be considered an adequate fit (Browne & Cudeck, 1989). Case A, RMSEA=0.043 [90% CI = 0.041, 0.044] can be considered a good fit, whilst case B, RMSEA = 0.070 [90% CI = 0.067, 0.073] can be considered an adequate fit. Both higher values of the 90% confidence interval are below the 0.80 limit (Kenny, 2015) and the lower value of Case A is below the 0.05 limit (Kenny, 2015). Given the complexity of an integrally informed model that attempts to provide a holistic assessment of a complex adaptive system, the instrument performed well with respect to both reliability and construct validity.

Reliability of the self-organising map analysis

The reliability of a study indicates whether a method, if reapplied, would yield the same result (Babbie, 2010). It should be noted that within a complexity paradigm, reality is emergent - phenomena co-evolve with their environments (Chapman, 2016; Wells, 2013). Some variation between measurements of complex systems is thus to be expected. Just the act of observation has been shown to influence phenomena at a quantum level (Baets, 2009; Chapman, 2016; Norton, 2015). This was demonstrated in the double-slit experiment (Bohr, 1928) that "photons exhibit wave or particle behaviour depending on how they are observed" (Chapman, 2016, p. 40). The complementary principle indicates that wave and particle properties of matter and energy are complementary but not exclusive; only one property can be measured at once (Chapman, 2016). Bohr (1928, p. 590) suggests that this principle creates difficulties in the process of idea generation:

> "I hope, however, that the idea of complementarity is suited to characterise the situation, which bears a deep-going analogy to the general difficulty in the formation of human ideas, inherent in the distinction between subject and object".

This is similar to the notion of ontological plurality, in which the approach to measurement affects the ontological status of the phenomenon (Esbjörn-Hargens, 2010). It can therefore be argued that replication will only ever be partially successful due to the observer effect, ontological plurality and the ongoing co-evolution of the phenomenon and environment.

As a data reduction technique, SOMs necessarily result in some loss of detail when mapping relationships amongst original variables (Scarborough & Somers, 2006). Several approaches have been suggested to measure the reliability (Bodt, Cottrell, & Verleysen, 2002), or rather quality, of a SOM. The quantisation error is one such method that measures the Euclidean distance between a vector and its mapped location (Scarborough & Somers, 2006). This was implemented in the SOM analysis and is displayed as a quality plot in each case which shows the mean distance of objects mapped to the codebook. Scarborough and Somers (2006) also recommend that qualitative assessment of the solutions is used to check whether clusters represent meaningful groups when considered in light of theory and practice. This was implemented through comparison with theory and narrative interviews with stakeholders in each organisation. The qualitative strand is discussed in the next section.

3.4.2 Qualitative strand

The second phase of an explanatory sequential design uses qualitative methods to draw inferences from the initial quantitative phase, where "the researcher interprets how the qualitative results help to interpret the quantitative findings" (Creswell & Plano Clark, 2010, p. 70). Qualitative research considers the phenomenon in its natural setting as seen through the perspective of participants (Babbie, 2010; Maxwell, 2009). The emphasis is on detailed and rich descriptions of subjective experience (Geertz, 1973).

The qualitative strand has an emic focus in that it is orientated towards an insider perspective. Whilst the quantitative strand has an etic focus in that the survey design provides an observer viewpoint, it should be noted that this study acknowledges the complementarity of etic and emic perspectives as suggested by Morris, Leung, Ames, and Lickel (1999). The Cassandra survey included axes from both subjective and objective perspectives through the application of the integral quadrants (Wilber, 2000). The qualitative strand draws on the emic focus to unpack the quantitative strand.

In the qualitative strand, individual interviews with a narrative design were conducted, allowing for multiple stakeholders to interpret the clusters identified through the self-organising maps. The data were transcribed and coded in Dedoose, a computer assisted qualitative data analysis software (CAQDAS), using narrative inquiry methods.

Designing the qualitative strand

After the quantitative data had been collected, several qualitative designs were considered as an approach to interpreting the quantitative results. Creswell and Plano Clark (2010) stress the importance of the qualitative phase of an explanatory sequential study being designed after the quantitative phase has been completed. Adopting a complexity view of the research process requires that the transformations that occur between the subsystems of the research process, namely between the author, system of ideas and phenomenon, be considered reflexively during the research process (Alhadeff-Jones, 2013). The key focus was to establish which quantitative results required further explanation (Creswell & Plano Clark, 2010).

To do this, Weber's (2003) levels of researcher reflexivity framework was implemented. A key consideration was whether to use expert interviews or narrative interviews in the qualitative

strand of the research. A narrative interview is a form of unstructured, in-depth interview (Jovchelovitch & Bauer, 2000), which seeks to generate detailed and holistic accounts rather than succinct responses or general statements (Riessman, 2008).

Expert interviews were considered as an alternative approach. From the perspective of modernisation theory, expert knowledge is an aspect of institutional reflexivity (Giddens in Meuser & Nagel, 2009), and a means whereby organisational activities can be examined. The status of expert in this approach is attributed by the researcher on account of his or her role as informant (Walter in Meuser & Nagel, 2009). This requires criteria to be generated to distinguish between experts and non-experts (Meuser & Nagel, 2009), which may become problematic with wicked problems such as corporate sustainability and climate change where expertise is often distributed across a complex adaptive system (Baets & Oldenboom, 2009; Chapman, 2016; Wells, 2013). The researcher reflexivity framework was used to reflect on this choice in more depth. The populated framework is presented in Table 3.4.

Level of reflexivity	**Description of level of reflexivity**	**Application of level to research**
Meta-theoretical reflexivity	This level of reflexivity considers broad and general assumptions and ideas we hold about the world (Weber, 2003).	The ontological plurality of corporate sustainability and climate change makes epistemological plurality an advantage (Esbjörn-Hargens, 2010). Narrative as opposed to expert interviews have the advantage of allowing for multiple narratives rather than privileging an expert position. Acknowledging ontological plurality means that we must consider expertise as partial, as epistemology is also plural. A narrative approach accommodates epistemological plurality by acknowledging the co-construction of reality (Robert & Shenhav, 2014).

Theoretical reflexivity	Whilst theories are useful in representing and explaining phenomena, they can also constrain the way in which phenomena are perceived and studied (Weber, 2003). Theoretical reflexivity is the process of juxtaposing different perspectives using competing theoretical lenses.	Integral theory offers a pragmatic means of juxtaposing competing theoretical perspectives. Adopting a narrative approach offers the advantage of being able to consider the construction of the narrative from each integral quadrant and applying it in a framework which makes room for a wide range of stakeholders. Expert interviews, depending on the method of data analysis used, are more likely to result in the fractured representation of the phenomenon.
Research method reflexivity	"Reflexive researchers consider the interplay between the research methods they have a propensity to employ in their work and the sorts of theories they build to account for the phenomena that are their focus" (Weber, 2003, p. ix).	The holistic nature of narrative inquiry makes it a useful method when studying complex phenomena. Narrative inquiry lends itself to an enactive epistemology, as narratives are a means of enacting reality. It also has advantages for developing research outputs that can be applied in practice. Expert interviews generate data from expertise-orientated discourse which potentially limit enactment to similar experts.
Interpretation reflexivity	Interpretative reflexivity involves the careful consideration of assumptions and biases underlying interpretation of data (Weber, 2003).	Narrative data are interpreted holistically, theorising from the case rather than the themes or structural elements identified during coding (Riessman, 2008). This is advantageous when studying complex systems which cannot be understood by analysis of parts. Expert interviews run the risk of reducing to "true but partial" perspectives which are analysed separately.

Table 3.4: Levels of researcher reflexivity

A further consideration was the use of individual interviews as opposed to using focus groups or a combination of the two. Individual interviews, whether they be semi-structured or in-depth, offer benefit when detailed information is sought on a complex topic that requires personal contact, flexibility and clarification through interaction (Babbie, 2010; Remenyi, 2011). A focus group format also has important advantages. Focus groups bring together knowledgeable informants of similar status and concentrate on the dialogue among focus group members in responding to research questions (Babbie, 2010; Remenyi, 2011). This has the important advantage of allowing for engagement between different and possibly contested narratives, which is less possible with individual interviews. Focus groups run the risk of participants not feeling comfortable to speak candidly (Remenyi, 2011). This study utilised an individual interview format for several reasons.

The self-organising map analysis yields clusters of respondents which can be analysed with respect to both the cluster construct rating profile and the demographic indicators. Analysis yielded 5-6 clusters per case, which in condensed form resulted in numerous pages of data (cluster dashboards). In considering whether to use a focus group or interview format, individual interviews offered the important advantage of being able to clarify understanding of the dataset. Despite interviewees receiving the data in advance, further clarification was often required. Individual interviews limited the potential for misinterpretation.

Another factor to consider was the geographic distances as the interviewees were based in Nambia and Botswana, while the researcher was based in South Africa. The need to conduct the research remotely was a key consideration in deciding to use an individual interview format. Whilst focus groups can be conducted virtually, there were concerns about building a trusting environment online or telephonically, and about facing difficulties in ensuring each member of the focus group understood the output of the quantitative strand of the research. The researcher therefore opted for individual interviews which were applied using a narrative inquiry design.

Sampling procedure

Purposive sampling is a form of non-probability sampling based on the researcher's considered judgement of which units will be most useful or representative (Babbie, 2010), and

is used to identify individuals who are knowledgeable and experienced regarding the focus of the research (Creswell & Plano Clark, 2010).

Palys (2008) recommends that when selecting an approach to purposive sampling researchers think about what they are trying to accomplish and what they want to know. Since emergence is associated with rich interactions between networks of agents (Baets & Oldenboom, 2009; Chapman, 2016; Holland, 1998), the researcher wanted the widest possible range of perspectives included in the study, and therefore used maximum variation sampling as the first stage of a multi-stage sampling strategy.

Maximum variation sampling is a form of purposive sampling which involves identifying respondents covering the "spectrum of positions and perspectives in relation to the phenomenon" (Palys, 2008, p. 697). Maximum variation sampling is beneficial with a heterogeneous sample as it supports the identification of patterns which emerge across a wide variety of perspectives or positions with respect to the phenomenon of interest (Patton, 1990). The advantage of this approach is that the variation enhances the representativeness of a small sample, whereas the disadvantage is that it is at risk of being affected by bias since it is based on personal judgment (Elder, 2009).

To address this, the sampling criteria were collaboratively applied in consultation with the organisational sponsors and key stakeholders. Patton (1990, p. 172) suggests that maximum variation sampling is useful in creating thick descriptions that emphasise the uniqueness of each case, and to determine shared patterns that "cut across cases and derive their significance from having emerged out of heterogeneity". The sampling criteria (see Appendix D) were implemented to identify an initial set of 28 informants across both cases. Sampling was implemented in Case A's operations in Namibia and Botswana. Zambia was omitted, due to operational constraints, from the qualitative strand of the research. Case B included only Namibian operations.

A multi-stage sampling technique was employed to increase the variation of views through a subsequent snowballing sampling phase in which informants were asked at the end of interviews to suggest additional people for interviewing (Babbie, 2010). Patton (1990) suggests the approach is useful for identifying key informants who are information-rich or ones who can be considered critical cases. The principle of maximum variation was maintained during this stage of the sampling. This strategy proved very useful in locating informants that had valuable

perspectives that were not represented in the initial sample. The snowball sampling stage was applied until saturation, which resulted in the initial sample increasing from 28 to 43 informants across both cases. The sampling profiles for each case are presented in the findings chapters.

Obtaining permissions

Employees were invited to participate in the interview with a letter which outlined the requirements for participation and ethical considerations (Appendix E). This letter was distributed with a covering message from the executive sponsor which served to confirm organisational permissions and encouraged participation by contextualising the benefits of the study to the business.

Once the informant had accepted the invitation, a "dashboard" summary of the output of the quantitative data was supplied together with guidelines on how to prepare for the interview. Informants were given the opportunity to familiarise themselves with the dataset, as there was a lot of data to assimilate in the interview.

Narrative interviews

Narrative interviews were conducted to explore the interviewee perception of corporate sustainability at the firm, and to interpret the output of the qualitative strand of the research as presented in a "company dashboard" which was supplied prior to the interview. Interviews were between 60 and 90 minutes in duration and conducted virtually, either on a voice-over-internet protocol or over Zoom, a web conferencing application. Since the interviewees were based internationally, a virtual format had the advantage of not increasing the carbon footprint of the study.

A narrative interview (NI) aims to support the informant to generate a detailed narrative account of the phenomenon, rather than providing brief answers and statements (Riessman, 2008), since the "underlying presupposition is that the perspective of the interviewee is best revealed in stories where the informant is using his or her own spontaneous language in the narration of events" (Jovchelovitch & Bauer, 2000, p. 4). An NI thus has a more conversational and flexible format and seeks to use open-ended questions to elicit narrative opportunities. An NI is a form

of unstructured, in-depth interview (Jovchelovitch & Bauer, 2000) which attempts to trigger a narrative rather than follow a typical question and answer format.

Storytelling can be considered a self-generating schema which "structures a semi-autonomous process activated by a pre-determined situation. A narration is elicited on the basis of particular cues, and, once the informant has started, storytelling will sustain a flow of narration drawing on underlying tacit rules" (Jovchelovitch & Bauer, 2000, p. 4). The intention is thus to trigger a self-sustaining narrative during the interview.

A key advantage of an NI within a complexity paradigm is that a narrative represents a holistic account of the interviewee's experience of the phenomena. This avoids disjuncture and the separate presentation of components of experience, by allowing for the construction of a narrative in which elements are synthesised into a narrative account:

> "Looking at how interviewees connect their responses into a sustained account, that is, a story, brings out problems and possibilities of interviewing that are not visible when attention is restricted to question-answer exchanges" (Mishler, 1986, p. 67).

Narrative meaning is constructed in relation to audience, represented not only by the interviewer, but also by the broader audience of readers who are anticipated to read the research report (Esin, Fathi, & Squire, 2014). In this way, meaning is jointly constructed by interviewee and interviewer as a context for the conversation is established (Mishler, 1986). Detailed accounts add plausibility to the development of the storyline and this construction is determined relative to the audience (Jovchelovitch & Bauer, 2000). This approach is consistent with a complexity paradigm in making space for plural epistemological positions.

In preparation for the interviews, the researcher conducted preliminary discussions with the executive sponsor for each case on the corporate sustainability initiatives taking place in each organisation and reviewed each company's integrated annual reports and sustainability-related documentation, media and case studies available on the respective organisations. "Exmanent" questions to address the research aims were developed and translated into "immanent" questions during the interview - the questions were contextualised using the main narrative.

The interview protocol was created by modifying the Jovchelovitch and Bauer (2000) narrative interview structure, and is outlined in Table 3.5. The function of each phase and application of the phase to this study are presented. The final interview protocol is displayed in Appendix F.

No.	Phase	Function	How phase used in the research
1.	Initiation	Formulating initial topic for narration.	Building rapport, exploring the informant's understanding of corporate sustainability and articulating the purpose of the research.
2.	Main narrative	Triggering a narrative and encouraging the narration non-verbally until the coda (conclusion of the story).	Triggering the narrative by linking the journey to sustainability with each company's brand positioning, which in both cases created a direct access point to the sustainability narrative. In some interviews narratives were presented in a summarised manner, and reached the coda prematurely. Whilst the level of narrative formulation was noted, attempts were made to re-trigger the narrative.
3.	Questioning phase A: *Narrative*	Immanent questions using the language of the informant to reflect on the narrative.	Translating the exmanent questions of the interviewer into immanent questions using the language of the informant to address the gaps in the study. The aim here was to allow for opinions, attitudes and causes to be spontaneously addressed by the informant rather than directly probed to keep the narrative intact.

4.	Questioning phase B: *Clusters*	Open questions to reflect on the sustainability narrative using the survey results.	Asking open-ended questions to use the clusters from the SOM analysis of the Cassandra survey to reflect on each company's journey to sustainability. A "company dashboard" was provided which presented the quantitative results visually. This phase followed a semi-structured format.
5.	Concluding talk	Using the conclusion of the interview for relaxed discussion and to trigger a more informal account of the narrative.	Triggering less formalised accounts of the narrative and implementing the snowball sampling. The questions used were identified during the course of the interview.

Table 3.5: Narrative interview structure

Source: Adapted from Jovchelovitch and Bauer (2000, p. 5)

Data recording procedure

The interviews were conducted virtually, either on a voice-over-internet protocol or over Zoom, a web conferencing application. These channels were selected as they allowed for direct digital recording. The interviews were conducted across Namibia and Botswana, and there was varying quality of internet connectivity, which at times resulted in data loss. One interview recording was discarded due to poor audio quality. The recordings were stored on a password protected cloud service and transcribed verbatim.

Narrative analysis procedure

Narrative analysis was used to analyse the transcripts. A narrative mode of thinking has been shown, alongside the logico-scientific mode, to be useful for complexity approaches to understanding organisations (Tsoukas & Hatch, 2001). Narratives are individual and collective acts of constructing meaning and interpreting experiences (Luhman & Boje, 2001; White,

1987). A narrative design goes beyond the construction of meaning and enacts this meaning through the “telling of the story”, which can also be seen as the act of the informant influencing the social system and context in which he or she is operating.

A pluralist ontology necessitates the exploration of a multiplicity of narratives, thereby emphasising the contextual nature of knowledge (Esbjörn-Hargens, 2010; Grbich, 2004). To do this, it is important to think not only about the phenomena as narrative, but also about our thinking concerning the phenomena as narrative. This reflexivity is characteristic of a complexity approach where “our understandings of complex systems and their properties will always be grounded in the narratives we construct about them” (Tsoukas & Hatch, 2001, p. 1007).

To achieve a reflexive approach to coding, it was important to have flexibility in the coding process; this was implemented through the use of computer assisted qualitative data analysis software (CAQDAS). CAQDAS offers substantial advantages in making coding more exploratory through increased flexibility resulting from features such as renaming, merging and modifying codes (Friese, 2012). Dedoose, a CAQDAS, was used to code the transcripts and to support the analytic process. Dedoose was chosen for its user-friendly and intuitive design, as well as its mixed method capability which enabled the researcher to apply code weights which supported a more granular level of analysis.

Since CAQDAS expands the range of what is possible, there are implications for how methods are applied which often benefit from adaptation for the software application environment (Friese, 2012). Friese (2012) proposes an interaction between three activities, namely, (i) noticing things, (ii) collecting things, and (iii) thinking about things, whereby interesting aspects of the data are identified, and the coding structure is developed through multiple iterations of coding and reflecting on the coded material.

Narrative analysis facilitated the holistic perception of organisations as complex systems. This required moving beyond categorisation and the analysis of parts to exploring the phenomenon holistically and contextually. This is regarded as a key feature of a narrative approach to research:

> “What is perhaps unique to narrative research is that it endeavours to explore the whole account rather than fragmenting it into discursive units or thematic categories. It is not

the parts that are significant in human life, but how the parts are integrated to create a whole—which is meaning" (Josselson, 2014, p. 226).

In addition to providing a holistic view, a narrative approach resists closure in that the narrative is always in transition as it is continuously revised as it is retold in different situations and to different audiences (Bakhtin, 1986). Narrative analysis attempts to gain a sense of the overall meaning and then analyses this with reference to the parts in order to arrive at a holistic view that encompasses the meaning of the parts, following the hermeneutic circle approach (Josselson, 2014):

1. The researcher gains a perspective of the overall structure of the themes of the narrative through reading the interview as a whole. The researcher moves recursively between the meaning of the part and whole, in a co-implicative manner.
2. The researcher identifies different "voices" and interprets the narrative from these perspectives to gain a view of the dialogue between these voices in the narrative.
3. The researcher continues these iterative readings until a "gestalt" or coherence emerges that encompasses contradictions embedded in the narrative.
4. The researcher then considers the dialogue between the emergent view (or "gestalt") and the academic literature, being aware of shifting discursive contexts and meanings.

This approach attempts to create what Schleiermacher termed a "hermeneutic circle" in which an "understanding of the whole illuminates the parts, which in turn create the whole" (Josselson, 2014, p. 227). This can be seen as congruent with a complexity perspective in which the whole is seen as greater than the sum of its parts, and the parts are seen as greater than the whole (Morin, 2008).

Cross-case procedure

After the data analysis of each case had been completed, a cross-case analysis was conducted. One case was an embedded case study comprising the holding company in Namibia and a subsidiary in Botswana[7], whilst the other holistic case included one entity in

[7] The Zambian subsidiary was not included in the qualitative strand of the research.

Namibia. Cross-case data synthesis was achieved through an adapted version of Stake's (2006) cross-case procedure:

1. Themes were collated across all three cases, and the expected utility of each case for each theme was rated, where utility indicates the extent to which a case is useful for developing a particular theme.

2. A matrix to cross tabulate themes and findings was constructed and each case was analysed to identify theme-based assertions.

Strategies to enhance trustworthiness

This section discusses strategies devised to increase the trustworthiness and rigour of the study. Validity is a somewhat contested term in the context of qualitative research due to an orientation towards a subjective epistemological position (Maxwell, 2009; Riessman, 2008). Guba (1981) proposes that naturalistic research requires a different conceptualisation of quality criteria rather than simply applying the validity and reliability constructs typical of quantitative research:

- Credibility is used in preference to internal validity to establish the "truth" of findings for the informants.

- Transferability is used in preference to external validity to establish the extent to which findings are applicable to other contexts.

- Dependability is used in preference to reliability to determine the extent to which findings would be similar if the study were repeated with similar informants or in a similar context.

- Confirmability is used in preference to objectivity to establish the extent to which findings emerge from the narrative of the informants as opposed to the researcher bias and interests.

The reconceptualisation of quality criteria for qualitative research has been widely utilised (Shenton, 2004) and is advantageous in supporting the implementation of quality criteria that are relevant to the qualitative research strand of this study. The application of the Guba (1981)

quality criteria in this study using guidelines proposed by Shenton (2004) is discussed in Table 3.6.

Quality criteria	**Description**	**Application in research**
Credibility	Credibility refers to the extent to which a true picture of the phenomena being investigated is presented (Shenton, 2004).	There were preliminary meetings and interactions to develop an understanding of the organisational context. Interview data were triangulated with data from supporting documents and reflections from the researcher's journal (see Appendix G). The mixed method design allowed for the qualitative data to be interpreted by multiple stakeholders in each case. Member checks were conducted with organisational stakeholders to establish the credibility of the analysis of each case. There was clear communication around ethical procedures to increase the levels of honesty of informants. Organisational stakeholders were involved in the sampling process to reduce researcher bias in selection and to ensure informants had necessary levels of exposure to the phenomenon under investigation.
Transferability	Transferability indicates the extent to which there is sufficient contextual information for a reader to assess whether the findings	Background contextual data on each of the cases were supplied. The self-organising map analysis offered a clear indication of the organisational context in each of the integral quadrants, and care was taken to

	can be applied in another setting (Shenton, 2004).	provide detailed descriptions of phenomena to facilitate comparisons.
Dependability	Dependability addresses the issue of reliability where the replication of the study in a similar context would result in similar results. Dependability is closely associated with credibility (Shenton, 2004).	Detailed descriptions of methods were presented in this chapter and within the case findings. Methods were carefully situated in a research paradigm. Regular journaling provided a means of reflecting on the quality of application of the research protocols (see Appendix G).
Confirmability	Confirmability refers to the extent to which the findings are attributable to the data and not the predispositions of the researcher (Shenton, 2004).	The complexity paradigm in which the research was situated was carefully defined and research assumptions identified. The limitations of the research and methods were articulated. Detailed methodological descriptions were provided to allow for suitable scrutiny of the results.

Table 3.6: Strategies to enhance trustworthiness

3.5 Conclusion

This chapter positioned this study within a complexity paradigm and identified key ontological and epistemological implications. The methods employed in this explanatory sequential mixed-methods multiple-case study were explained. The protocols followed in the initial quantitative and subsequent qualitative strands were discussed. The next chapter presents the findings for the first case.

CHAPTER 4: CASE A FINDINGS

4.1 Introduction

This chapter sets out the findings of the first of two cases, which will be referred to as Case A. Background to the case will be provided and the results of the Cassandra survey and interviews will be explored in relation to how sustainability emerges in each financial institution, and the role of coherence in enabling the emergence of sustainability. The findings of case study B will be presented in chapter 5, and the findings of both cases will be compared and discussed in chapter 6.

4.2 Company context

Case A is a regional financial services group, headquartered in Namibia, with interests in banking, specialist finance, insurance, asset management, unit trust management and property development. In addition to Namibia, the group has operations in Botswana and Zambia. The group has business interests across the Southern African region. The group is listed on the Namibian Stock Exchange and at the time of study had assets to the value of approximately N$42.9 billion.

4.2.1 Progress towards sustainability

The level of progress towards sustainability will be analysed to determine the relevance of the case for studying fourth wave sustainability, which was discussed in chapter 2. This section comprises deskwork and the analysis of available company documents using the Edwards (2009) stages of organisational sustainability model. The model, which was discussed in chapter 2, was selected as it offers a comprehensive stage model based on the synthesis of multiple stage models.

The documents reviewed included the 2016 and 2017 integrated reports, as well as a sustainability maturity assessment conducted by Ernest & Young in 2015[8]. The documents were scrutinised to determine the stage of organisational sustainability maturity using the Edwards (2010) stages of organisational sustainability model, as displayed in Table 4.1.

Edwards (2010)		**Ernest & Young (2015)**
Stages of sustainability	**Stages of organisational sustainability**	**Business Sustainability Maturity Index**
Preconventional	Subsistent organisation	
	Avoidant organisation	Risk
Conventional	Compliant organisation	Compliance
	Efficient organisation	Opportunity
Postconventional	Committed organisation	Integrating
	Sustaining organisation (local)	Leading
Post-postconventional	Sustaining organisation (global)	

Table 4.1: Stages of organisational sustainability

The Ernest & Young (2015) report positioned the group in the early stages of the opportunity phase. Classification was linked to the Global Reporting Initiative (GRI) indicators, with most indicators falling into the compliance maturity state (Ernest & Young, 2015).

Since late 2015 when the study was conducted, the company has become a signatory of the United Nations Global Compact commitment, pledging to embed the ten principles in its

[8] To protect the anonymity of the organisations, the integrated reports and sustainability maturity assessment are not included in the reference list.

strategy and operations. Sustainability is now a strategic focus area. The sustainability philosophy of the group articulates a holistic conceptualisation of sustainability, including environmental, social and economic dimensions, and aims to embed sustainability, which is a key aspect of a post conventional stage of sustainability (Edwards, 2010):

> "Credibility is key to value creation. We believe that we are part of a bigger, interconnected global system. Our approach to being a responsible local, regional and global citizen is built into the DNA of all our businesses in Namibia, Botswana and Zambia. We aim to be open, transparent and accountable in our reporting" (Integrated Annual Report, 2017, p. 88).

An intention towards the next stage of organisational sustainability has thus become part of the formal organisational discourse and reporting. The Board Sustainability and Ethics Committee was established in 2016 to assist the board in enabling good corporate citizenship through the implementation of a sustainability and ethics strategy (Integrated Annual Report, 2017). A sustainability process model was designed for the sustainability programme with six domains identified:

1. Environmental and social management system to assess environmental and social risks in the credit application process.
2. A material risk assessment conducted through a board level strategic management process.
3. Internal environment sustainability focused on the implementation of environmental practices as part of organisational culture initiatives.
4. Corporate social investment addressing a broad range of social needs to enable socio-economic development.
5. Membership of the United Nations Global Compact to support the group to make a meaningful contribution to regional and global sustainability initiatives.
6. Global Reporting Initiative key performance indicators to monitor and regulate sustainability initiatives.

The domains and process model provides a comprehensive sustainability framework for the group. The conceptualisation of sustainability is holistic, with a focus on embedding sustainability into the business. Whilst the sustainability strategy is well formulated, the Board Sustainability and Ethics Committee is “still in an early development phase” (Integrated Annual Report, 2017:90) and thus implementation is not yet at a postconventional stage of maturity.

Thus far, implementation has focused on functional integration of sustainability, identifying key material matters that affect the group’s sustainability. The process integrated the group’s strategy, risk management, financial and stakeholder engagement; key sustainability indicators have been identified and measured (Integrated Annual Report, 2017). The process is less advanced in Botswana, which is still in the initial phase of sustainability measurement, in which material issues and key sustainability performance indicators have been identified. The process is due to be commenced in the Zambia business within the next year.

The group can thus still be seen to be progressing through the conventional stage of organisational sustainability and starting to move towards a postconventional approach which is outlined in the strategy but still some way off regarding implementation.

4.3 Quantitative findings

The group was holistically assessed using the Cassandra survey, and analysed using self-organising maps to illustrate the emergence of corporate sustainability. The quantitative data for Case A will be presented in this section. Each cluster identified in the data will be analysed.

4.3.1 Sampling profile

To gain a robust view of the emergence of sustainability in the group, the entire population of employees from supervisory management level and above was selected. The junior specialists and clerical levels and below were excluded due to the complexity of the Cassandra survey and anticipated difficulty in completing the survey due to lack of access to information, as well as the complexity of the questions.

4.3.2 Implementation of survey

The Cassandra survey was implemented on the SurveyMonkey platform and distributed online with a letter of invitation from the executive sponsor of the research, which contextualised the study from an organisational perspective and encouraged participation. A letter of consent was obtained from the organisation. Respondents participated voluntarily, providing consent as part of the survey. Whilst the link to the survey was whitelisted by the IT department and technical specifications checked, some issues were experienced in the Zambian context, which had an adverse impact on response rate.

4.3.3 Response rate

The response rate for the Cassandra survey is presented in Table 4.2:

Operation	Total population	Number of responses	Percentage Response
Namibia	1123	351	31.26%
Botswana	111	57	51.35%
Zambia	136	26	19.12%
Overall	1370	434	31.67%

Table 4.2: Response rate

The overall response rate of 31.67% was considered favourable given the length of the instrument, which has 72 items. The average response rate achieved historically with internal surveys in the group is 25%[9], indicating a satisfactory level of response to the survey.

Of concern were the lower levels of response from the Zambian operation, which at 19.12% falls below the average response levels. Attempts to increase response rates were thwarted by operational strain and technical issues. A decision was taken to retain the responses in the dataset as the issues inhibiting response were operational and technical, thus not likely to create a strong non-response bias. To deal with the lower response rate, the Botswana and Zambia results were interpreted to investigate differences between the Namibian and out-of-country contexts.

[9] Personal communication with head of business intelligence for the group.

4.3.4 Data cleaning

The dataset was cleaned by removing responses in which the survey was not completed or where there was no variation in responses across the entire instrument and the reversed items had not been identified, suggesting that the respondent might not have responded thoughtfully to the survey. This resulted in minimal changes to the dataset.

4.3.5 Missing data

Due to the complexity of the instrument it was decided, in discussion with the head of data intelligence for the organisation, to include an “I don’t know” response option. To be included, respondents had to have completed all items on axes for a minimum of 50% of the axes. Composite scores were derived and the Supersom function on the Kohonen package on R was implemented. In these cases, distances were normalised using:

$$\frac{n}{n - nNA}$$

Axes that had missing data were excluded from the analysis. This approach to handling missing data was selected to preserve the size of the dataset. The percentage of responses that were included are presented in Table 4.3. Note that the table indicates the number of respondents included but doesn’t indicate axes that were incomplete and therefore excluded from the respondents’ data.

Operation	Number of responses	Number of responses included	Percentage included
Namibia	351	278	79.20%
Botswana	57	48	84.42%
Zambia	26	23	88.46%
Overall	434	349	80.41%

Table 4.3: Missing data

4.3.6 Implementing the self-organising map in R

The self-organising map (SOM) analysis was implemented in R, using the Kohonen package. Packages sit within R, extending the functionalities of the programme. The SOM was used to conduct an exploratory segmentation of the data. A sequential learning algorithm, the default option in the Kohonen package, was used. This is an online stochastic learning algorithm.

Training process

The training process was set at 10 000 epochs. A plot of the training process, the change plot, is presented in Figure 4.1. This plot displays the mean distance to the closest codebook vector during the training. As the training process progresses through the iterations, the weights of the nodes become increasingly similar to the samples represented by that node (Wehrens & Buydens, 2007). The training is completed when the distances between each node's weight and that of the represented samples no longer decrease and the graph reaches a minimum plateau. This point of convergence is reached just beyond 8000 iterations.

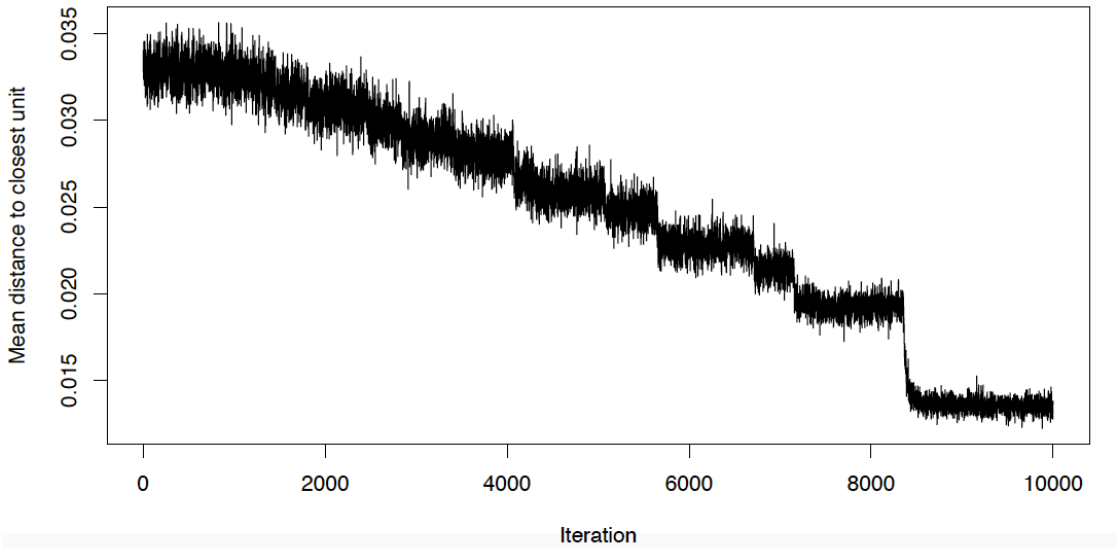

Figure 4.1: Change plot

Determining size of the grid

Different size maps were investigated. A 4X3 grid was initially implemented as all nodes had at least 10 objects mapped. There was, however, too large a variance between the node with the highest number of objects (N=80) and the nodes with the lowest number of objects (N=10). The grid size was then increased incrementally; a 10X10 grid provided the best representation with a more similar number of objects assigned to each node. The counts plot in Figure 4.2 displays the 10X10 grid with the scale. Most nodes have 2-8 objects mapped. Only one node, displayed in red, has over 15 objects mapped whilst most nodes have only 1 or 2 objects mapped. A 10X10 grid was thus selected for the SOM due to the small variance in the number of objects mapped to each node.

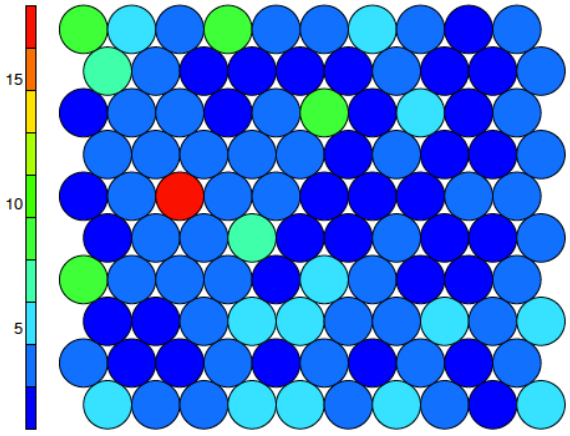

Figure 4.2: Counts plot

The quality plot, displayed in Figure 4.3, shows the mean distance of objects mapped to a unit to the codebook vector of that unit. Smaller distances indicate a better representation by the codebook vectors. The mean distance to the closest unit in the map is 0.46. Distances are small across most areas, which can be seen in nodes displayed in blue and green in the map, indicating a suitable quality of mapping. The quality plot thus supported the use of a 10X10 grid in the SOM analysis.

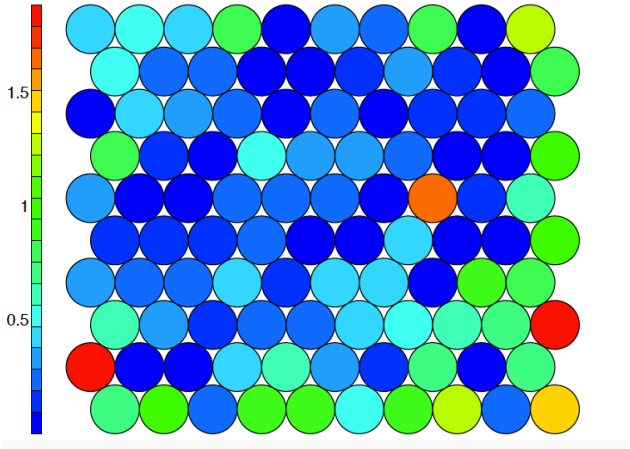

Figure 4.3: Quality plot

Heatmaps

The heatmaps in Figure 4.4 illustrate the distribution of each Cassandra axis across the map. The relationship between variables can be examined by comparing the shaded nodes for each map. Nodes sharing similar information are arranged in close proximity to each other. Similarity of patterns indicates monotonic relationship between the axes (Mostafa, 2009). The colour scale to the left of each map shows that cooler colours (blues and greens) depict a low rating, whilst warmer colours (yellows and reds) depict a high rating.

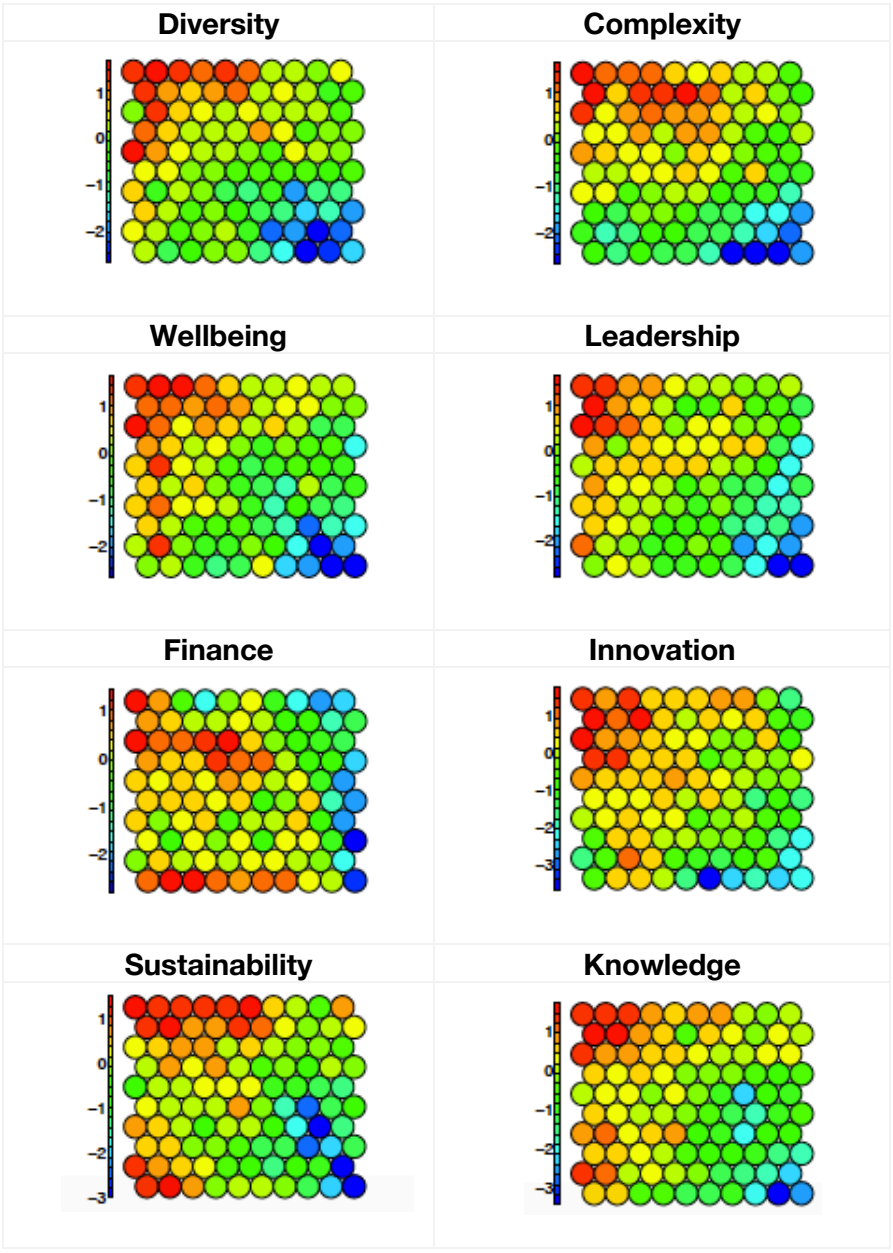

Figure 4.4: Heatmaps[10]

[10] Cassandra axes have been abbreviated as follows: Diversity = Diversity; Complexity = Complexity; Wellbeing = Personal Wellbeing; Leadership = Leadership and Teamwork; Finance = Financial Performance; Innovation = Innovation Potential; Sustainability = Sustainable Development and Social Responsibility; Knowledge = Knowledge and Learning.

The overall pattern is similar, with subtle differences across the heatmaps in Figure 4.4. There is an intensity of warm colours (high ratings) in the top left area of the grid across all the heatmaps. The warm colours extend down the map on the left side most notably for finance, sustainability and knowledge management. The distribution of greens and cooler colours (lower ratings) in the lower right and central parts of the map is most prominent in the diversity, wellbeing and complexity maps.

Whilst there are similarities across many of the maps, the sustainability and finance heatmaps show two regions which have clusters of high rating neurons. The maps will be more closely inspected for the cluster analysis.

Determining the number of clusters

A hierarchical cluster analysis with Euclidean distances, using complete linkages, was conducted. The results are displayed in the dendogram in Figure 4.5. The horizontal red dotted line indicates the height at which the number of clusters was defined. The position was selected to retain sufficient diversity in the data. This resulted in five clusters, four of which are represented by many respondents, and one of which includes three respondents.

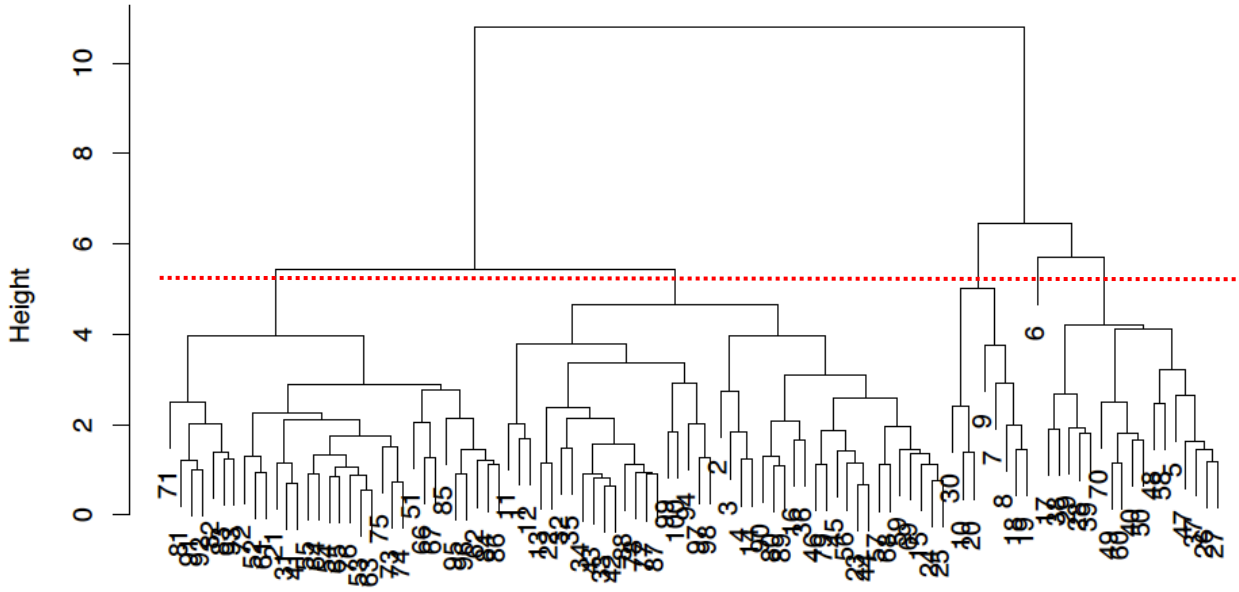

Figure 4.5: Dendogram

Identifying the clusters

The five clusters are displayed in the codebook vector plot (Figure 4.6). The circles in each node indicate the number of objects (respondents) mapped against each node. This figure displays the relative weighting of each node and is examined alongside the heatmaps with cluster boundaries (Figure 4.7) and mean scores displayed in Table 4.4.

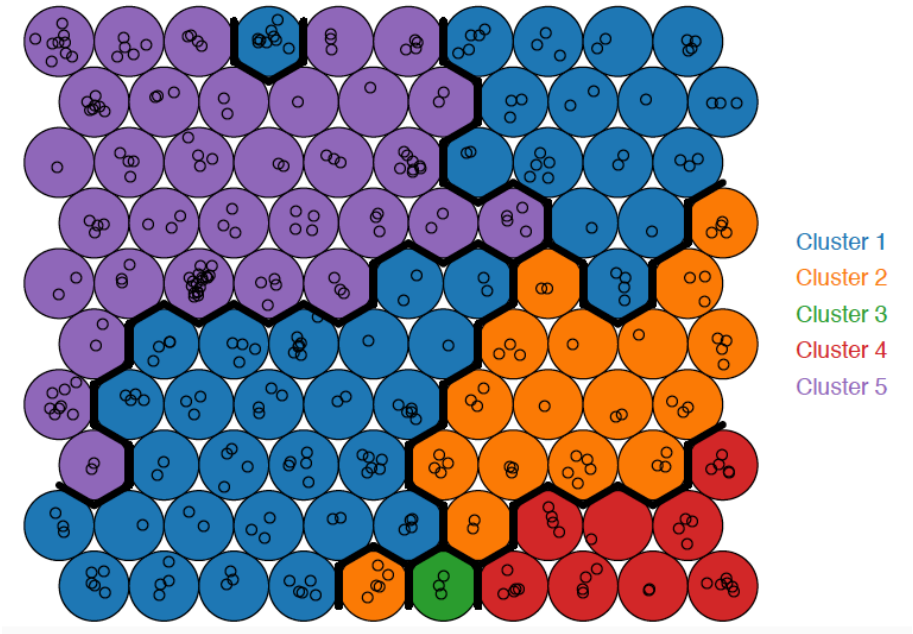

Figure 4.6: Codebook vector object mapping

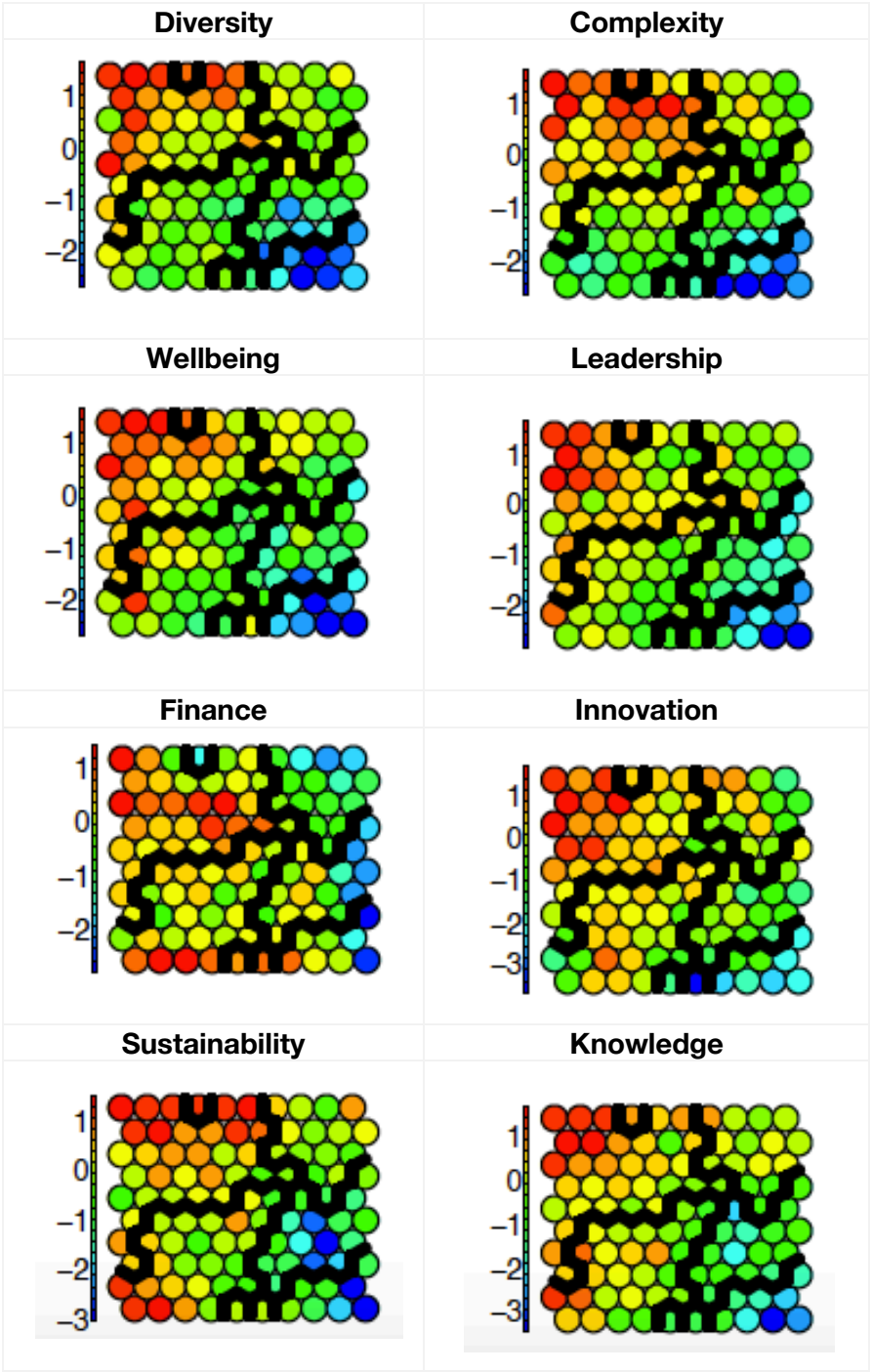

Figure 4.7: Heatmaps with cluster boundaries

Cluster	Freq.	Div.	Com.	Well.	Lead.	Fin.	Inn.	Sustain.	Know.	Mean
1	138	4.65	4.51	4.57	4.54	4.39	4.38	4.84	4.57	4.56
2	49	4.12	3.93	3.68	3.66	3.99	3.75	3.99	3.65	3.85
3	3	3.78	3.36	5	4.17	5.53	1	4.78	3.5	3.89
4	31	3.04	2.69	2.88	2.82	3.45	2.63	3.74	2.86	3.01
5	128	5.28	5.16	5.1	5.1	5.13	5.03	5.09	4.94	5.10
Mean		4.62	4.49	4.51	4.47	4.54	4.39	4.73	4.43	

Table 4.4: Cluster means[11]

[11] Cassandra axes have been abbreviated as follows: Div. = Diversity; Com. = Complexity; Well. = Personal Wellbeing; Lead. = Leadership and Teamwork; Fin. = Financial Performance; Inn. = Innovation Potential; Sustain. = Sustainable Development and Social Responsibility; Know. = Knowledge and Learning.

Cluster weights

The cluster weights are displayed in Figure 4.8. Note that four of the five clusters have a substantial weight. Cluster three, which represents three respondents, has a weight of 0.86%.

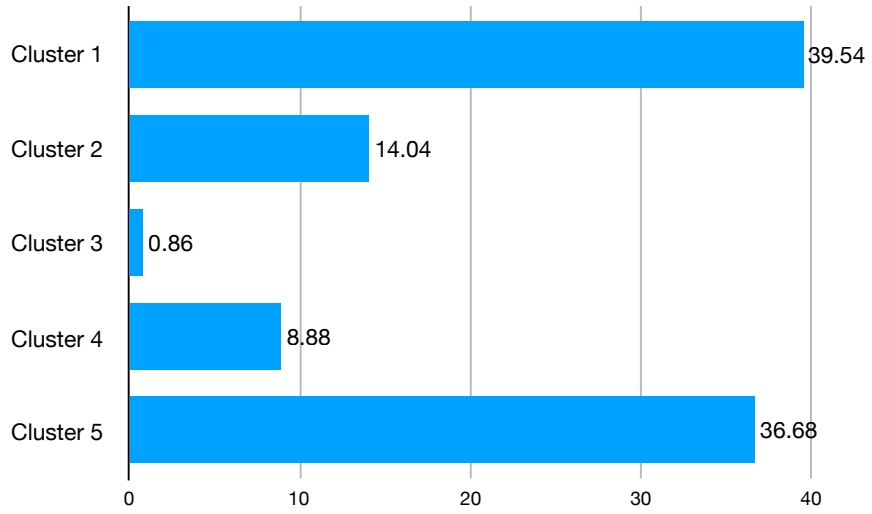

Figure 4.8: Cluster weights (%)

4.3.7 Level of coherence

The level of coherence, as discussed in chapter 2, is an important aspect of emergence. Emergence requires novelty but also coherence in structures, patterns and properties of a complex adaptive system (Goldstein, 1999), which arise through the interaction of many agents across the system (Goldstein, 1999; Stacey, 2010).

Figure 4.9 displays the mean scores of each cluster in solid lines and the overall mean in the dotted line. The level of coherence increases as the cluster means converge. Whilst there is a low level of coherence across all axes, the means of all the clusters are the most similar in the sustainability axis (the zone of coherence is marked with a green ellipse). The second most coherent axis is the finance axis (the zone of coherence is marked with a red ellipse). Two partial points of coherence are found in the knowledge axis.

Except for the outlying cluster (cluster 3), a pattern of increasing levels of differentiation between the axes can be observed as the overall mean for the cluster decreases. Clusters with high means (clusters 5 and 1) which are on or above the mean have very similar ratings across the axes. It seems that adopting a critical position emerges with a more nuanced view of the organisation.

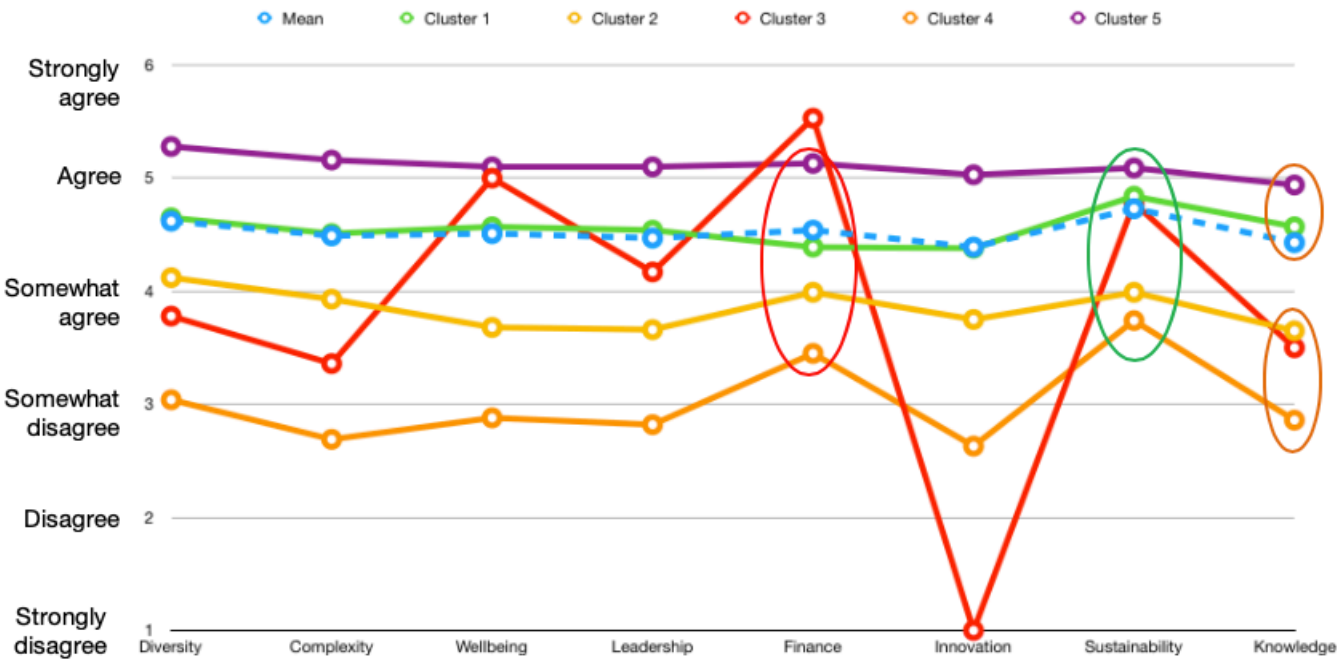

Figure 4.9: Cluster and sample means

Whilst coherence can be reasonably seen in the sustainability and finance axes, there seems to be a degree of similarity or balance between the ratings of the axes within most clusters. Sustainability requires a balanced and long-range coevolution across the integral quadrants (Esbjörn-Hargens & Zimmerman, 2009; Wilber, 2001). Whilst the co-evolution seems to be balanced, the organisation might benefit from a greater degree of interconnection between social networks within the organisation to support greater coherence which is hypothesised to enhance the emergence of sustainability in the organisation. The clusters will now be examined in detail, identifying key demographic differentiators per cluster.

4.3.8 Cluster 1: Guardians

The scores of cluster 1 for each axis, as well as the overall mean scores, are displayed in Figure 4.10. Cluster 1 is closest to the overall mean, and thus represents an optimistic mid-range view with the potential to mediate between other opinion groups in the sample. The sustainability axis has the highest rating with a 4.84 mean, followed by knowledge and wellbeing at 4.57.

This cluster has a 39.54% weighting and thus represents a widely-held perspective of the organisation. Given the large size of the cluster, it is important to inspect the heatmaps (Figure 4.7) to determine the diversity of perspectives within this cluster. Whilst the view is to some extent uniform for most of the axes, there are strongly contrasting views in the finance axis where the heatmap has warm colours in the lower-left region and cool colours in the top-right region of the cluster. The disagreement regarding the financial ratings in this cluster is the most varied in this cluster.

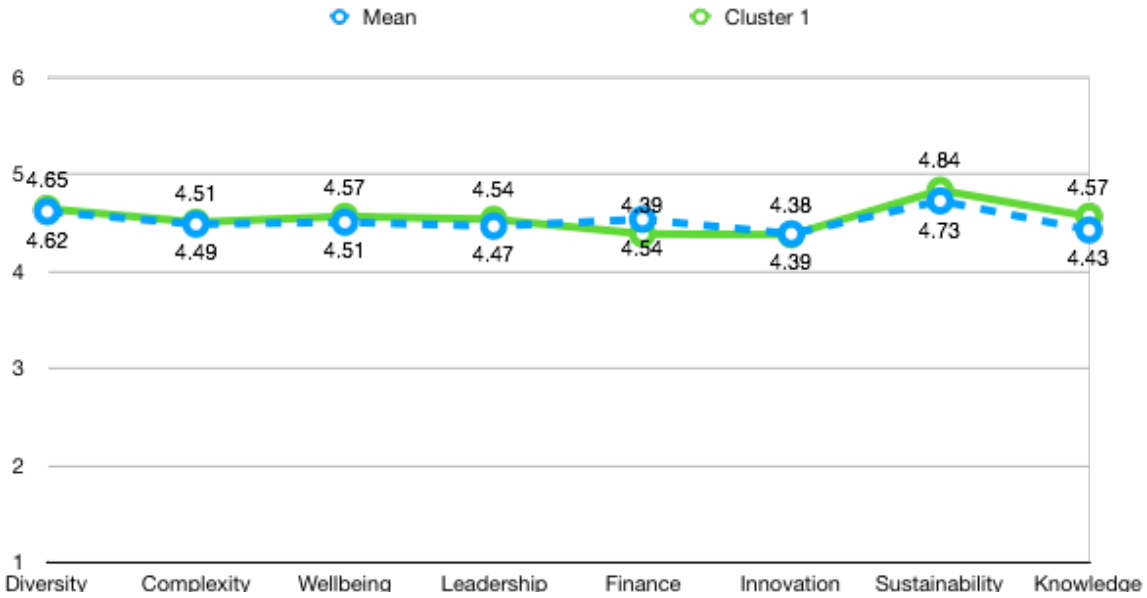

Figure 4.10: Cluster 1 mean scores

A more moderate degree of variation can be found in the sustainability, innovation and knowledge management heatmaps. The respondents that were most positive about the finance axis were also the most positive about sustainability. Those that were most critical of the finance axis had a moderately critical view on sustainability. There were also respondents

in this cluster that were moderately optimistic about finance, innovation and knowledge, whilst being moderately critical of the remaining axes.

The analysis focuses on demographic fields that help to differentiate the respondents in this cluster. There is a slightly higher representation of middle and senior management than in the overall sample, as is displayed in Figure 4.11. This difference, however, is marginal.

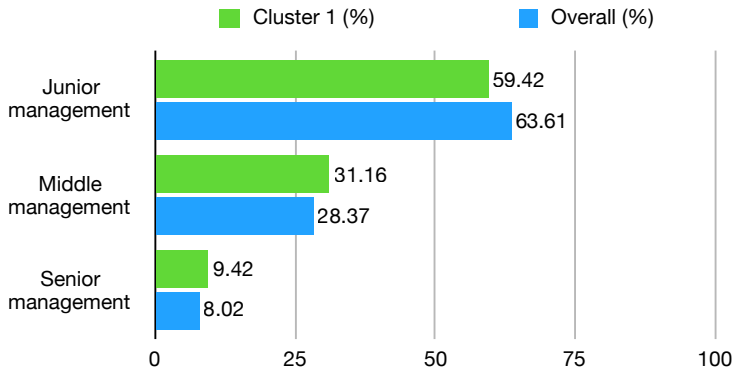

Figure 4.11: Cluster 1 management level (%)

The cluster has slightly higher representation of females (65.94%) than the overall sample (63.32%). Respondents from this cluster have slightly less representation from the 25-34 age category and slightly higher representation from the 35-44 age category, as can be seen in Figure 4.12.

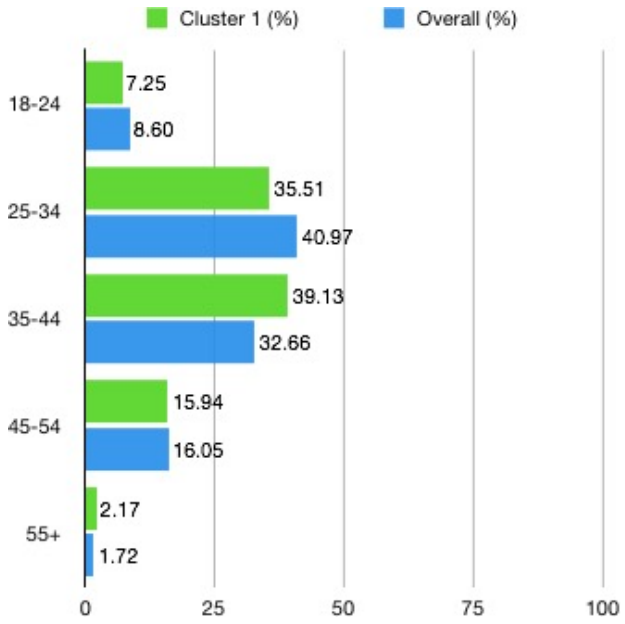

Figure 4.12: Cluster 1 age (%)

The distribution of the cluster per country is displayed in Figure 4.13. Cluster 1 has a very similar representation to the overall sample.

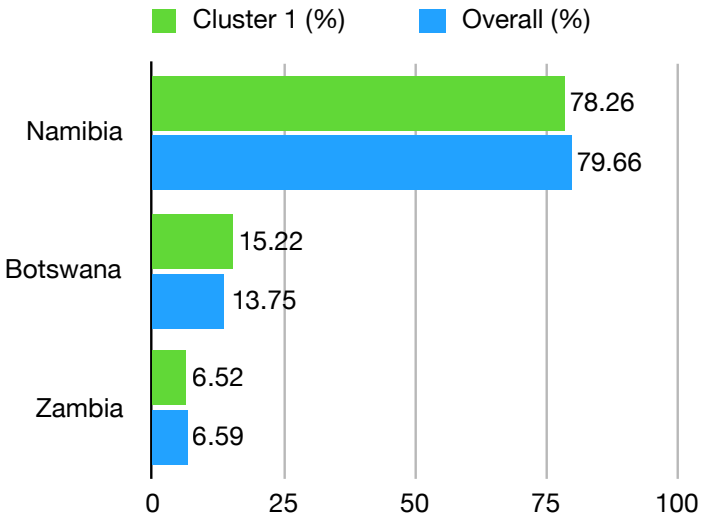

Figure 4.13: Cluster 1 country (%)

The cluster had a higher representation from the branch network than the overall sample, as is displayed in Figure 4.14. Note that the branch network category includes the retail bank, private bank, trust and estates, specialist finance branch, asset management and corporate banking.

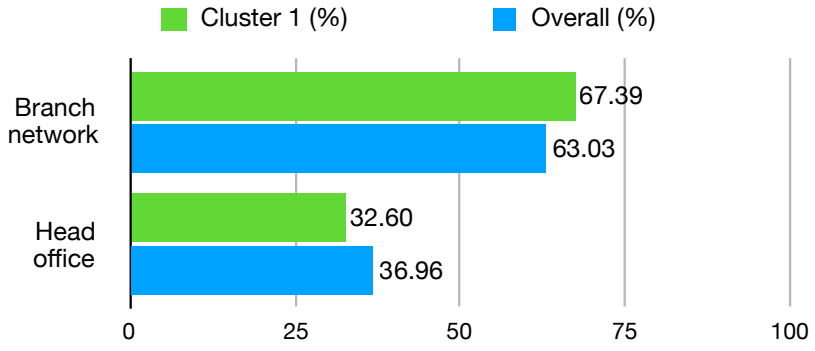

Figure 4.14: Cluster 1 corporate division (%)

The representation per division for this cluster is displayed in Figure 4.15. There is a high representation from the retail bank and specialist finance branch. Note that the bottom right block, which is not labelled, is marketing. Categories with only one respondent are not displayed, namely, asset management, group services, property development and treasury.

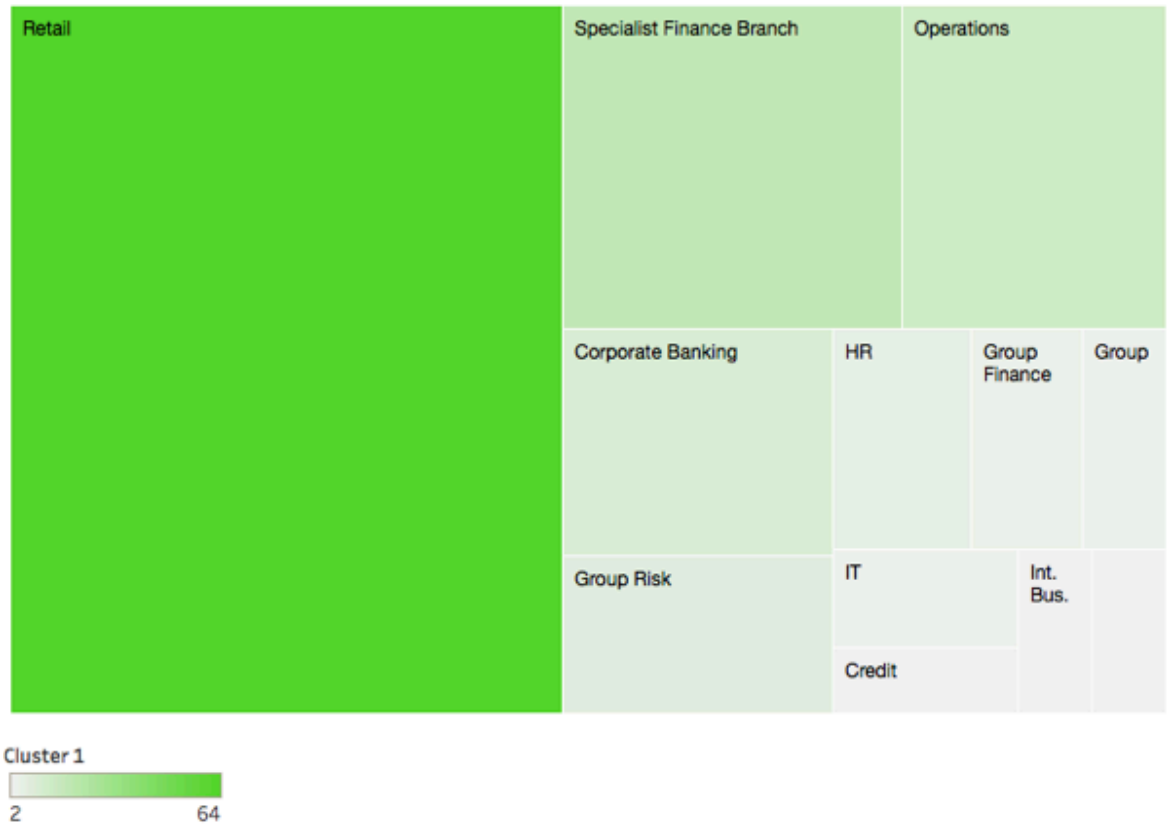

Figure 4.15: Cluster 1 divisions

These data suggest that most employees in management positions see the organisation as performing well in a holistic sense, and the low level of differentiation between axes may make respondents from this cluster less likely to identify critical issues in the business.

This cluster has been named the “guardians” as they are an important part of the mainstream (39.54% weighting) who are likely to assume the role of supporting and protecting the status quo. The guardians cluster has a very similar demographic profile to the overall sample across most demographic categories. The slightly higher representation of the middle and senior management categories can be seen as a mainstream endorsement of the status quo by respondents in the prime of their careers, particularly in the 35-44 age category. The low level of differentiation between axes may indicate less discernment and critical analysis of the business.

4.3.9 Cluster 2: Devil's advocate

The scores of cluster 2 for each axis, as well as the overall mean scores, are displayed in Figure 4.16. Cluster 2 is somewhat lower than the mean across all axes, and thus represents a moderately critical view of the organisation. The highest score is diversity (4.12), closely followed by sustainability (3.99) and finance (3.99). This cluster is most critical of the leadership axis (3.66). Falling just below the mean and having a relatively similar pattern in the ratings, although more critical, this cluster can be seen to be part of the mainstream view of the organisation (cluster 1). Instead of taking the mainstream view, this cluster is likely to critique the approach whilst adopting a relatively similar position to the mainstream. This cluster has a 14.04% weighting, thus having sufficient representation in the business to influence the agenda.

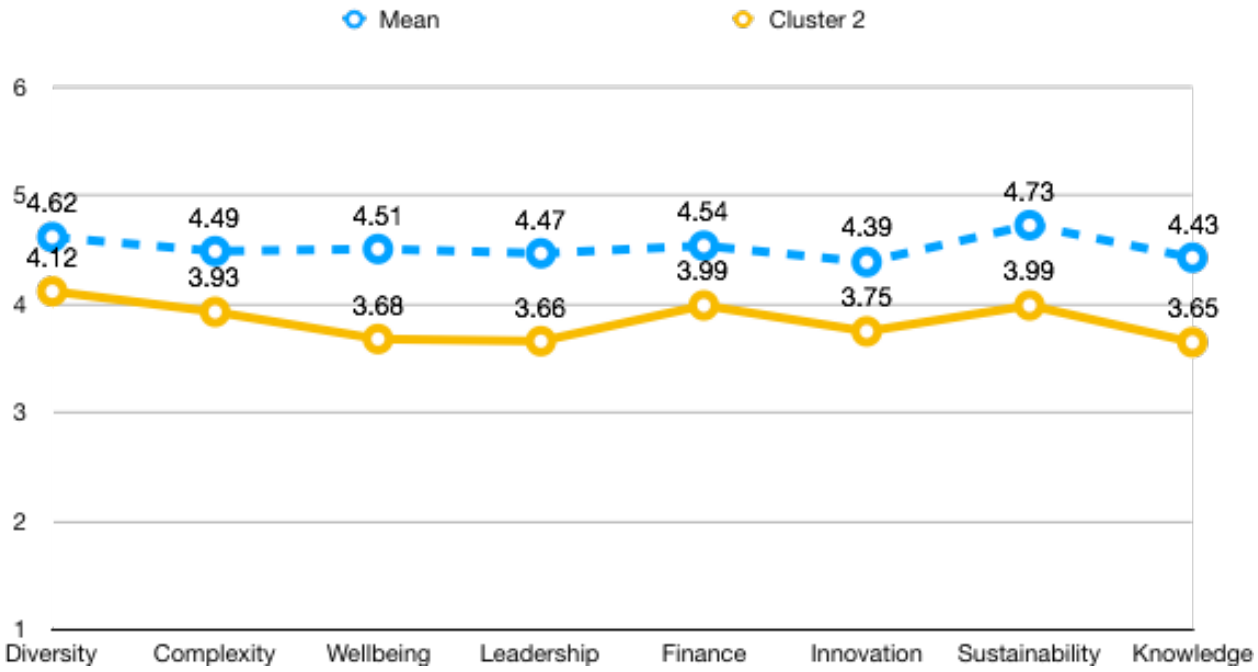

Figure 4.16: Cluster 2 mean scores

Close inspection of the heatmaps for this cluster (Figure 4.7) shows nodes in the centre of the sustainability cluster map with an inverse relationship with the same nodes in the finance axis. Nodes with a moderately high rating in finance have a low rating in sustainability. Interestingly, there are other nodes with a low rating in finance that have a moderately higher rating in sustainability. Respondents in this cluster thus lack consensus about how finance and

sustainability emerge, or it may vary across the business. Diversity and wellbeing nodes in the bottom of the cluster show low ratings in the same region.

As with the previous cluster, the analysis focuses on demographic fields that help to differentiate the respondents in this cluster. The distribution of levels of management is similar in this cluster to the overall sample. There is a slightly higher percentage of males in this cluster (42.86%) than in the overall sample (36.68%).

Interestingly, the respondents in this cluster tend to be young (Figure 4.17) and have a long tenure (Figure 4.18). This cluster has a higher representation from the 25-34 age category than the overall sample, and a higher representation of respondents who have been employed for longer than 5 years.

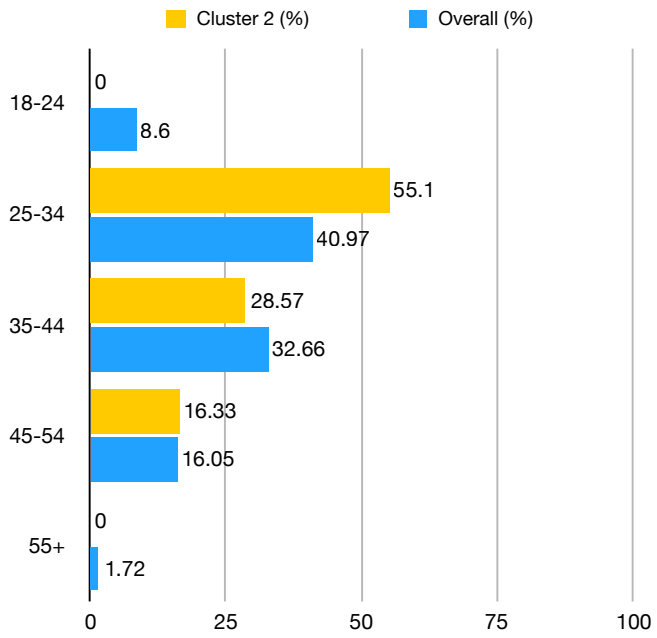

Figure 4.17: Cluster 2 age (%)

Respondents are likely to have started working at the organisation early in their careers and thus had their opinions shaped by the mainstream view. The 3-5 years tenure category is also well represented (Figure 4.18).

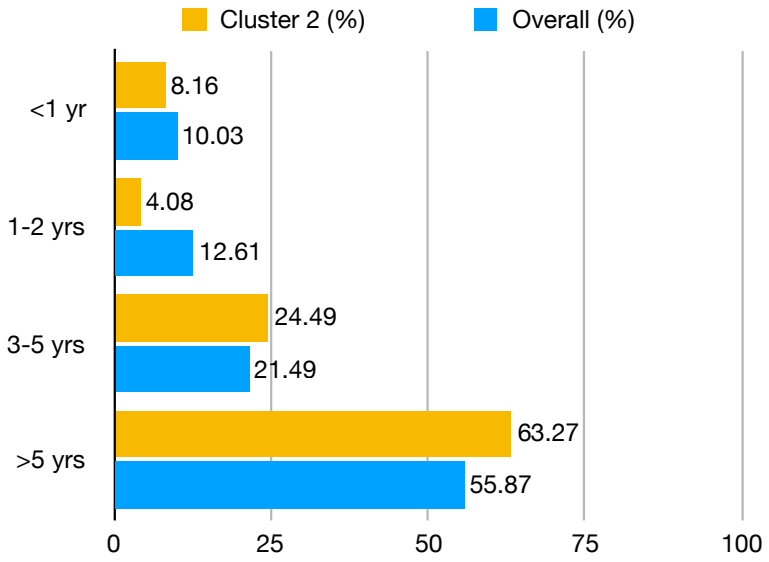

Figure 4.18: Cluster 2 tenure (%)

The more critical mainstream perspective of this cluster emerges with tertiary education, particularly at diploma and post graduate levels (Figure 4.19).

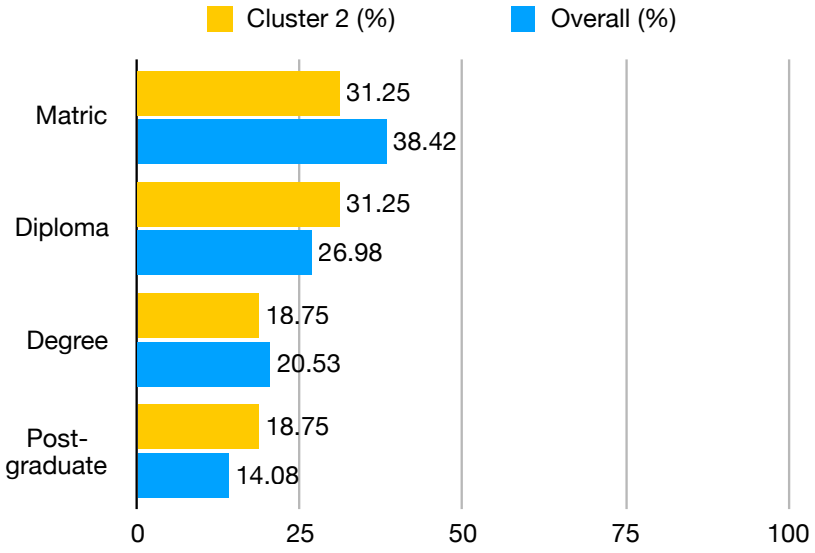

Figure 4.19: Cluster 2 education level (%)

The percentage of respondents per country for the cluster and overall sample is displayed in Figure 4.20. Cluster 2 has slightly more respondents from Botswana and Zambia, indicating a more critical view from the subsidiaries.

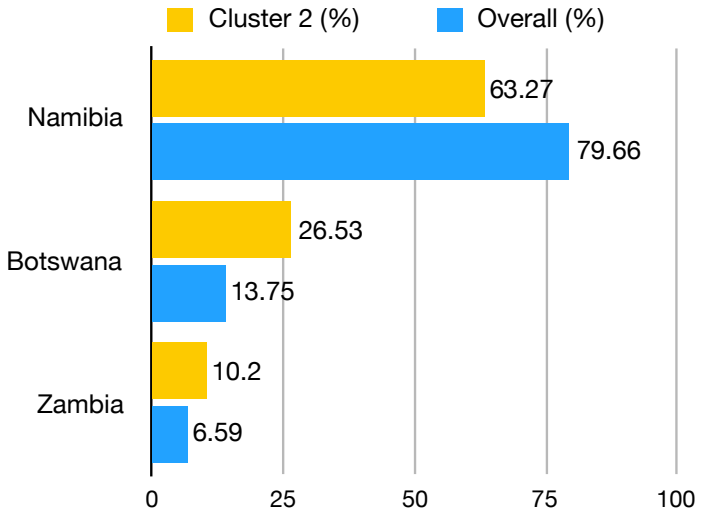

Figure 4.20: Cluster 2 countries (%)

There is a higher representation of respondents from the head office (48.98%) than in the overall sample (36.96%). The composition of this cluster per division is displayed spatially in Figure 4.21. There is a large representation from retail and operations, and a moderate representation from specialist finance and marketing.

Figure 4.21: Cluster 2 divisions

The cluster has been named “devil’s advocate”, as the respondents from this cluster adopt a critical view with moderate differentiation between axes whilst still being close to the mainstream (cluster 1). The tradition of *advocatus diabolic* was established in 1587 by the Catholic Church as part of the canonisation process to argue against miracles attributed to the candidate (Encyclopædia Britannica, 2008). In modern use, the devil’s advocate position describes a person’s countering of a point of view for the sake of debate and exploring the thinking, without being committed to the opposing view. The role of devil’s advocate is important when considering an integral perspective on corporate sustainability, in which inclusive dialogue is needed to explore multiple perspectives, where “sustainable solutions require the cooperation of as many perspectives as possible” (Mickey, Kelly, & Robbert, 2017, p. 12).

This cluster can be seen to be participating, albeit critically, in the mainstream (cluster 1). Thus, the cluster plays an important role in contesting the mainstream view, whilst maintaining commitment to the status quo. It is interesting that this cluster has a higher representation outside Namibia than the overall sample, as perhaps this distance gives perspective on the

overall business. Further development of differentiation between axes would be likely to enhance the effectiveness of this cluster in influencing the business.

4.3.10 Cluster 3: Pivots

The scores of cluster 3 for each axis, as well as the overall mean scores, are displayed in Figure 4.22. Cluster 3 has the most differentiated view of all the clusters, with an extremely optimistic view of the finance axis (5.53) and an extremely critical view of the innovation axis. Sustainability is the only axis that falls on the sample mean. This cluster represents an outlier view, with a cluster weight of only 0.86, comprising only 3 respondents.

Whilst it is important not to over-interpret a cluster with a weighting of 0.86%, outlier responses should be considered when exploring complex adaptive systems. Artificial neural network techniques are able to deal with outliers (Nag, Mitra, & Mitra, 2005) and noisy data (Venugopal & Baets, 1994).

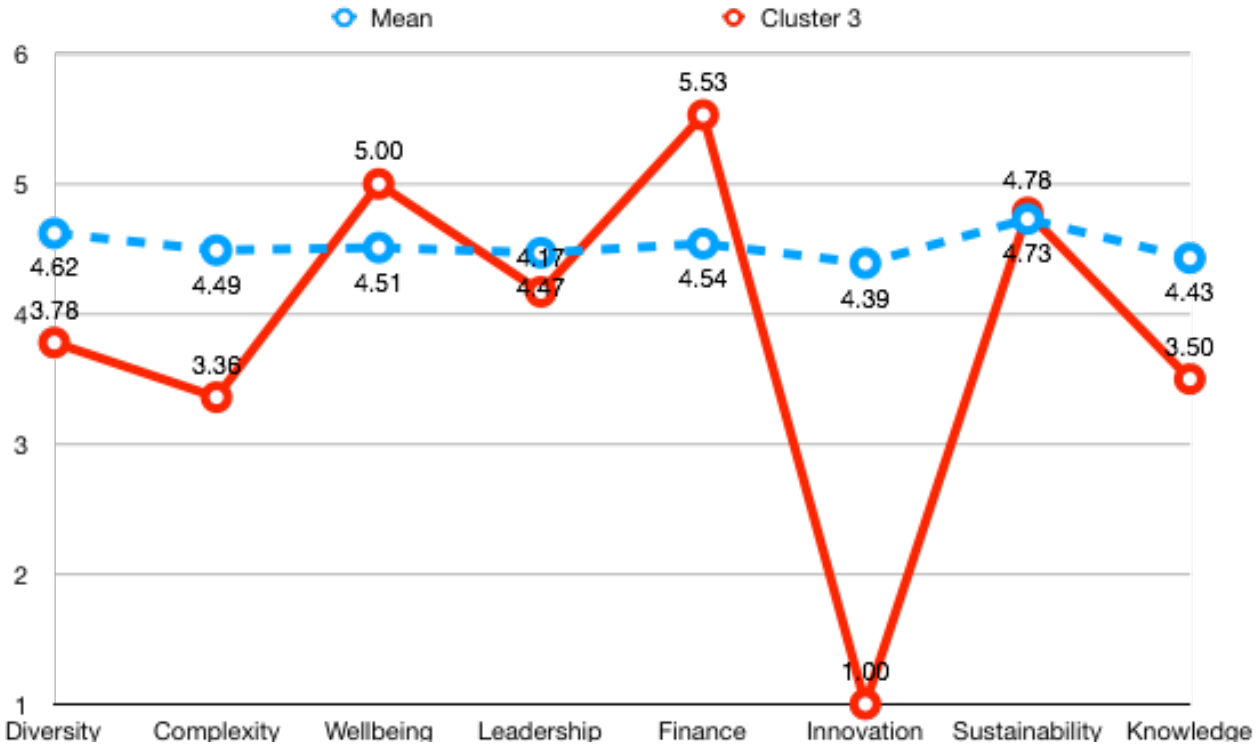

Figure 4.22: Cluster 3 mean scores

Since the cluster is only represented by one neuron, no additional information is available through inspection of the heatmap. This cluster has more females (66.76%) than the overall sample (63.32%). There is representation from junior and middle management levels only, as displayed in Figure 4.23.

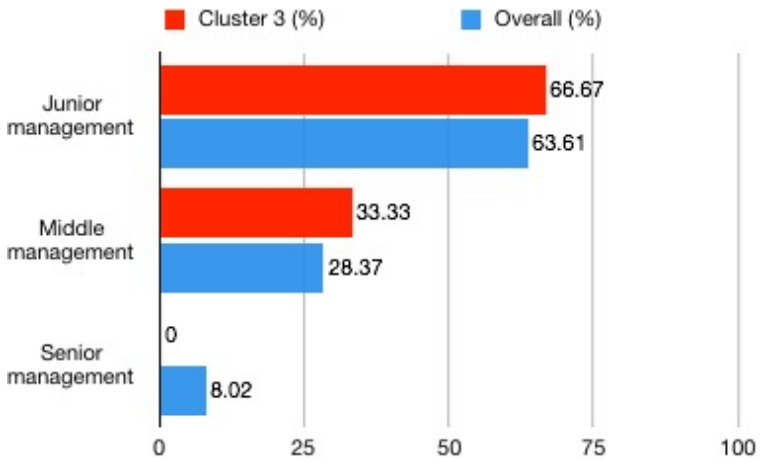

Figure 4.23: Cluster 3 management level (%)

The representation of the cluster at various levels of education is displayed in Figure 4.24. Two respondents from the cluster hold an undergraduate degree and one holds a diploma.

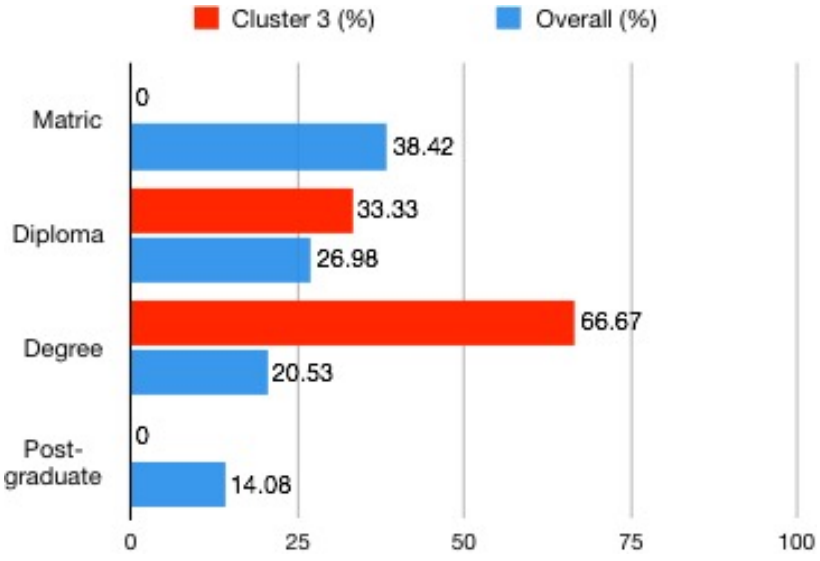

Figure 4.24: Cluster 3 education levels (%)

Two respondents are from the 25-34 age category and one is from the 35-44 age category. All respondents in this cluster are from Namibia; the divisions represented are indicated in Figure 4.25.

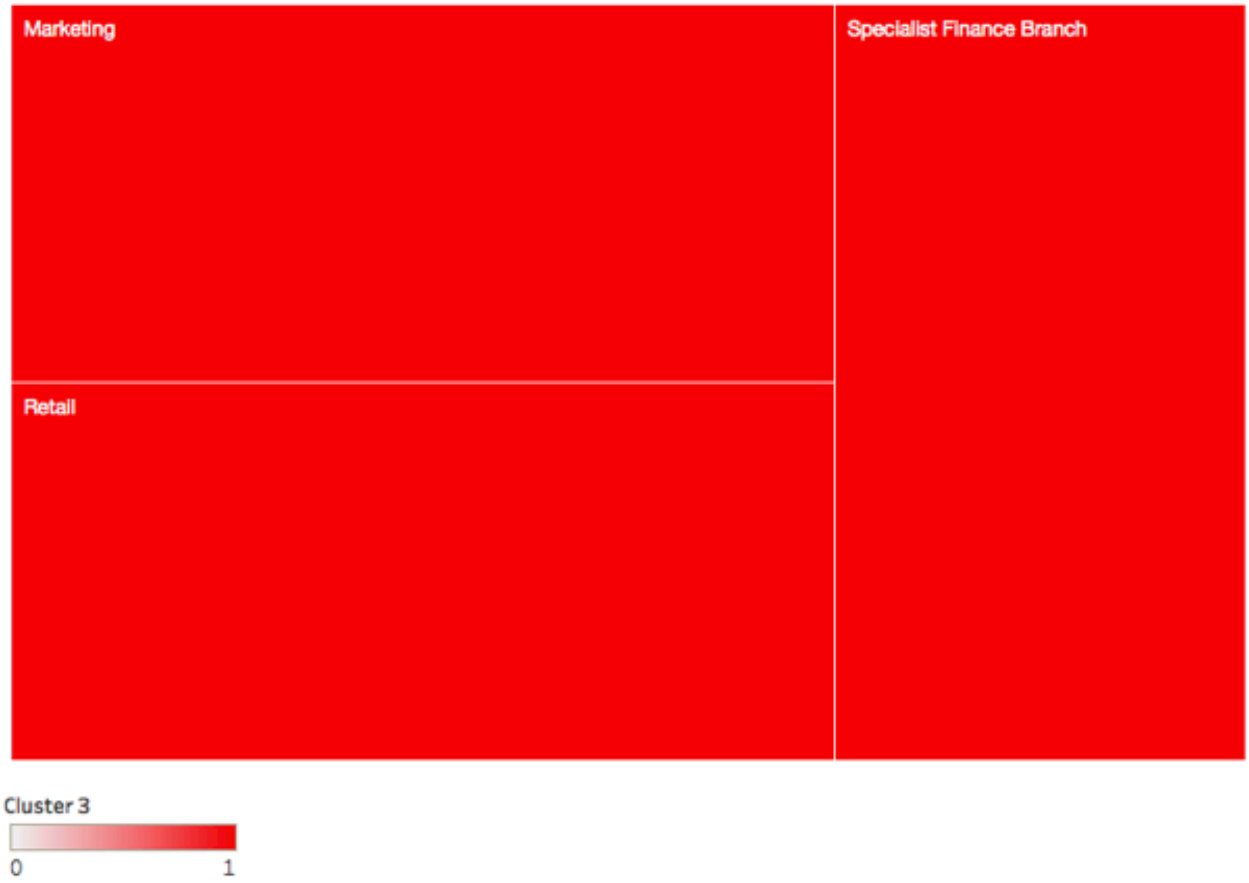

Figure 4.25: Cluster 3 divisions

This cluster is named “pivots” as it is reasonably close to the sample mean on three axes, forming points of coherence with the mainstream views of clusters 1 and 5, whilst deviating from these views with a much more critical view of innovation and moderately critical view of diversity and complexity. The cluster shares a more optimistic view of finance with several other clusters. This cluster has the potential to pivot between different views, thereby bringing together different interest groups. It must, however, be noted that this view is nascent and would likely need to have a higher weighting to have this effect in the system. A key message in this cluster is dissatisfaction with the level of innovation in the system, particularly in the branch network. Whilst this cluster should not be over-interpreted, it is important within a complexity perspective that outlying views are not ignored.

4.3.11 Cluster 4: The resistance

This cluster has the most critical view overall, with all axes falling way below the mean, as can be seen in Figure 4.26. The relatively higher scores in sustainability (3.74) and finance can also be seen to some extent in cluster 2. This cluster, with an 8.88% weighting, is particularly critical of the innovation axis (2.63), closely followed by complexity (2.69), as was the case with cluster 3. This cluster offers a clearly differentiated view without extreme ratings.

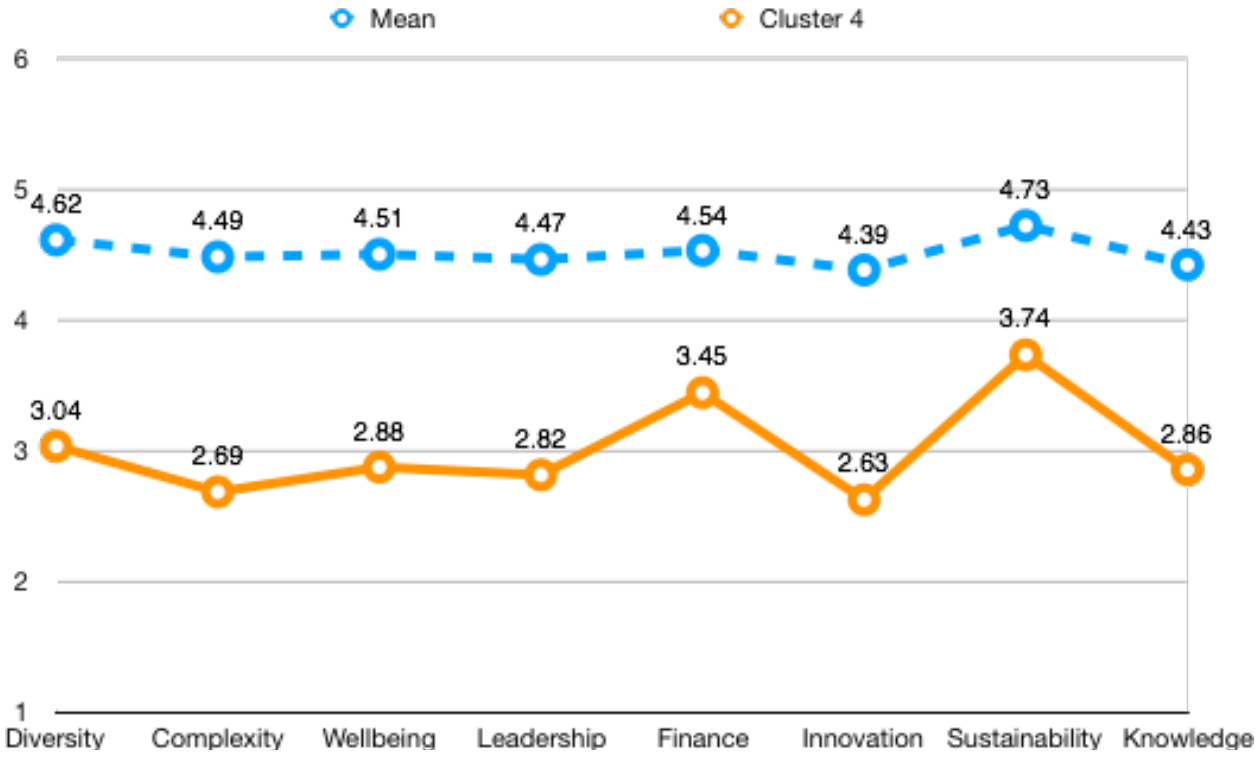

Figure 4.26: Cluster 4 mean scores

Inspection of the heatmaps for this cluster (Figure 4.7) shows nodes to the left of the cluster emerging together with higher ratings in finance and sustainability. It is thus only a portion of the cluster that has a more optimistic view of these axes. Similarities can be seen in the innovation and knowledge management axes with a slight warming across the entire top stretch of the cluster. These axes can thus be seen to emerge together.

The cluster has clear demographic differentiators. It is interesting to note that there is a higher representation of males (48.39%) than in the overall sample (36.68%); this is similar to cluster 2, which also has a critical outlook. It may be indicative of traditional gender roles.

The distribution of levels of management has a stronger representation from middle and senior management levels than the overall cluster, as can be seen in Figure 4.27. Advanced levels of education can be seen to emerge with a more critical view of the business.

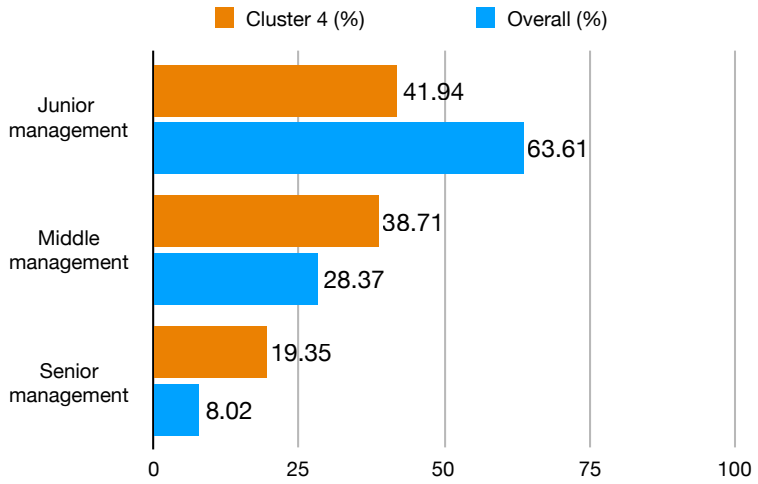

Figure 4.27: Cluster 4 management level (%)

The critical view in this cluster is also associated with higher levels of education, particularly at degree and post-graduate levels, as can be seen in Figure 4.28.

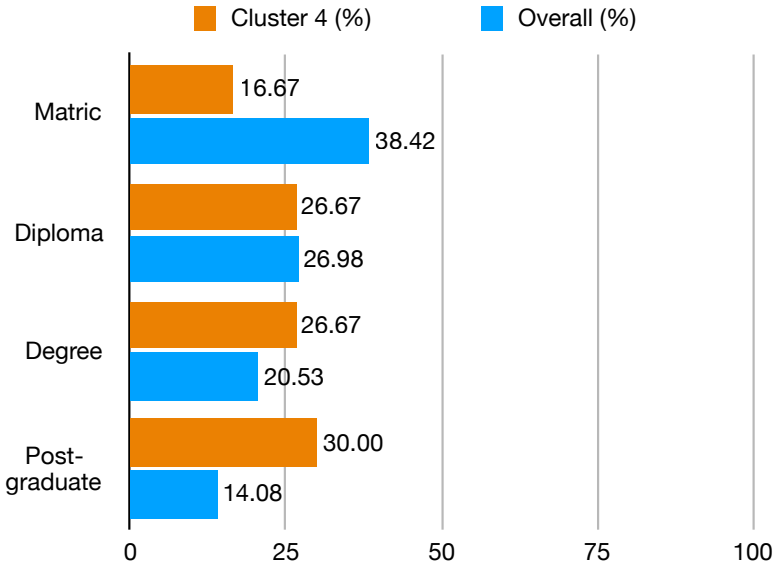

Figure 4.28: Cluster 4 education level (%)

Respondents from the cluster have a long tenure (Figure 4.29). This suggests that their viewpoints are informed by substantial experience in the business, but could also potentially

result from employees becoming cynical over the years. Since the axes are clearly differentiated, this is likely to be a well-informed view of the current state of the business.

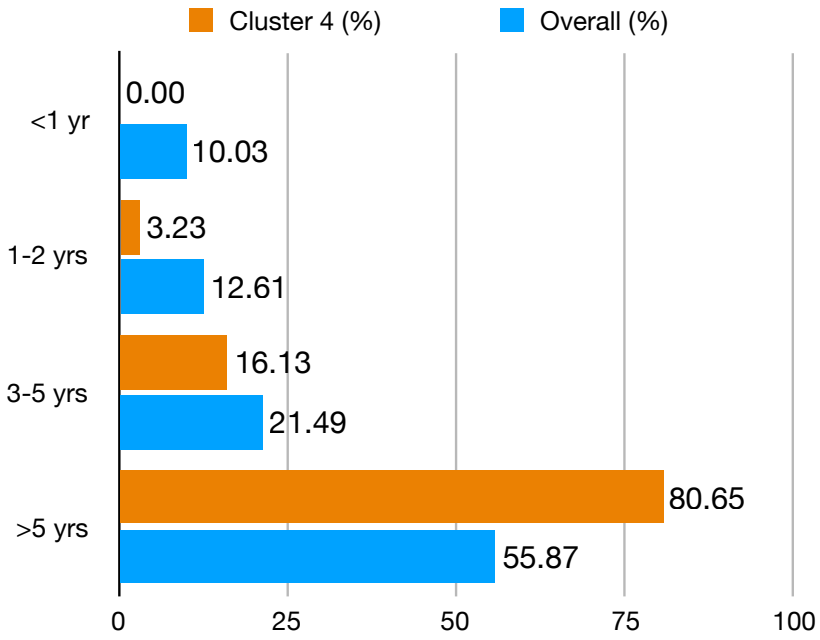

Figure 4.29: Cluster 4 tenure (%)

This cluster has an older profile than the overall population, as can be seen in Figure 4.30. It is possible that an older profile gives the respondents from the cluster more influence in the system, especially when viewed alongside the higher representation from middle and senior management levels in the cluster.

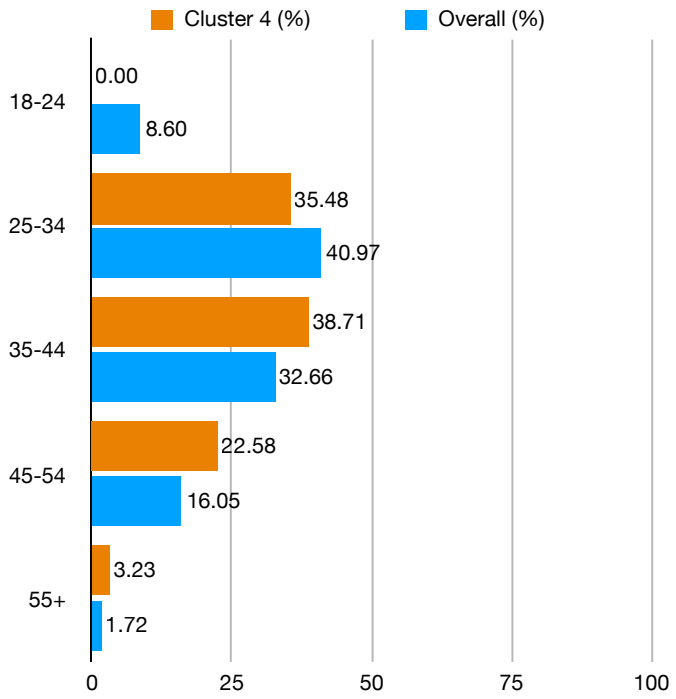

Figure 4.30: Cluster 4 age (%)

This cluster has a higher representation of respondents from outside Namibia (35.49%) than the overall population (20.34%), as can be seen in Figure 4.31. This result suggests the potential value of taking the view of subsidiaries into account. It involves the ability to view from different perspectives and leverage diversity.

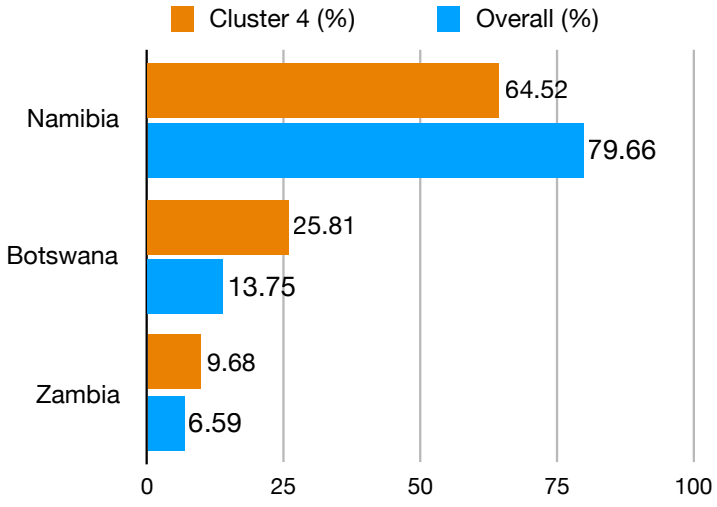

Figure 4.31: Cluster 4 country (%)

There is a higher representation from head office (58.06%), as opposed to the branch network, than in the overall sample (36.96%). The centre of influence of this cluster is in the head office structures in each country with good representation in the branch network. This is a potentially useful platform from which to influence the system.

The divisions represented in cluster 4 are displayed in Figure 4.32. Whilst there is strong representation from retail and corporate banking, the combined weight of the head office departments, particularly group finance, marketing and operations, is substantial. The unlabelled cell in the lower right is group services.

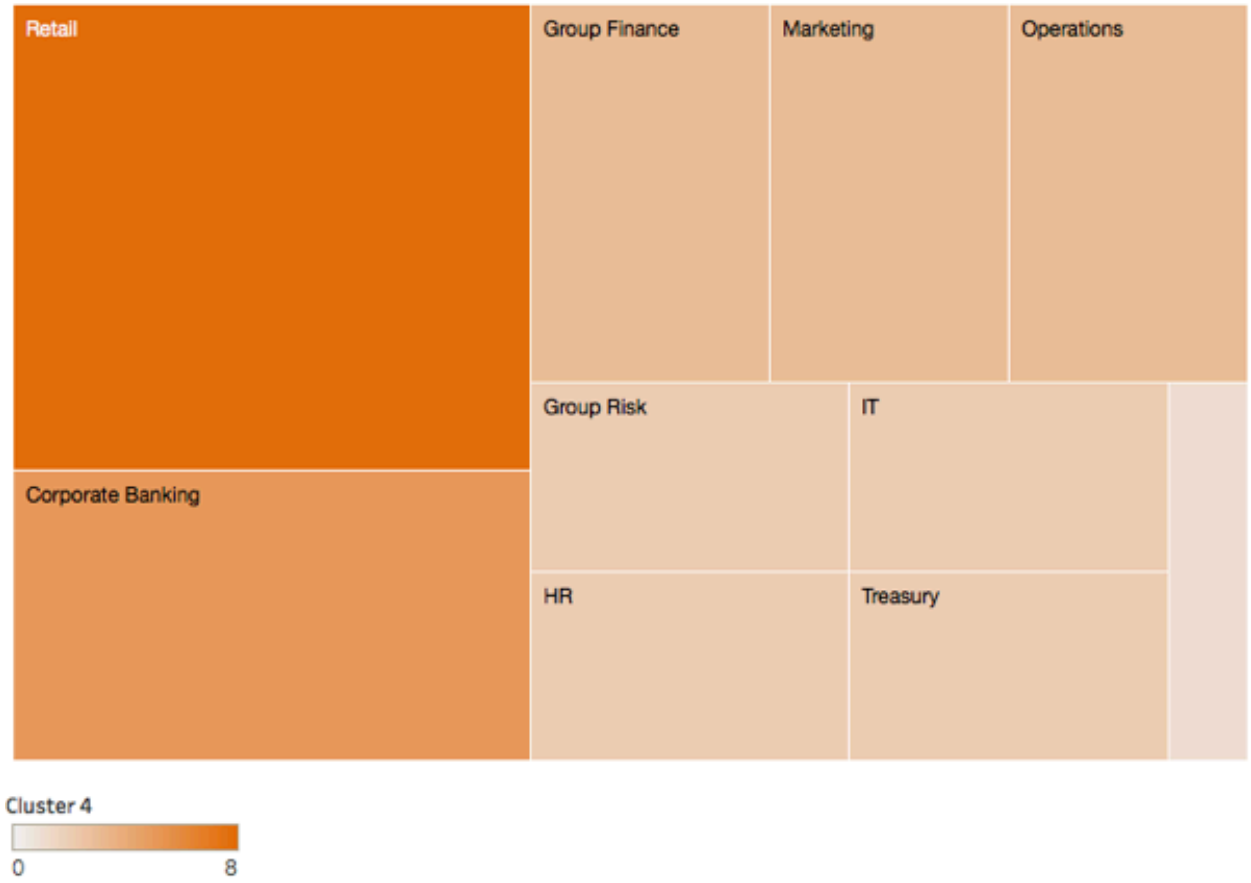

Figure 4.32: Cluster 4 divisions

This cluster has been named the “resistance”, as it is likely that it exerts a form of cultural or intellectual resistance which may be overt or covert, seeking to influence the organisation by highlighting current or future concerns. The level of differentiation between axes potentially indicates a clear perspective on the current state of the organisation, which can also be characterised as a critical view, since all the ratings fall below the mean.

It is interesting that this cluster has higher representation from middle and senior management levels and increases with tenure and education level. Experience and education seem to enhance the application of critical thinking. Whilst the sustainability scores are the highest of all the axes in this cluster, they are still the lowest sustainability ratings across the sample. This may indicate a longer time horizon and more comprehensive view when thinking about sustainability challenges. The seniority profile of this cluster is likely to support its ability to influence the system towards a more sustainable future.

4.3.12 Cluster 5: Praise singers

This cluster, displayed in Figure 4.33, had the most positive ratings across all the axes with an overall mean score of 5.10. The most positive ratings related to diversity, complexity and finance. The cluster had a weighting of 36.68%, which is the second heaviest weighting after cluster 1. This cluster forms a point of coherence with clusters 1 and 3 on the sustainability axis, representing a combined weighting of 77.08%. The view of this cluster seems to be disconnected from the sustainability maturity assessment, where ratings are substantially higher than the mean across all axes.

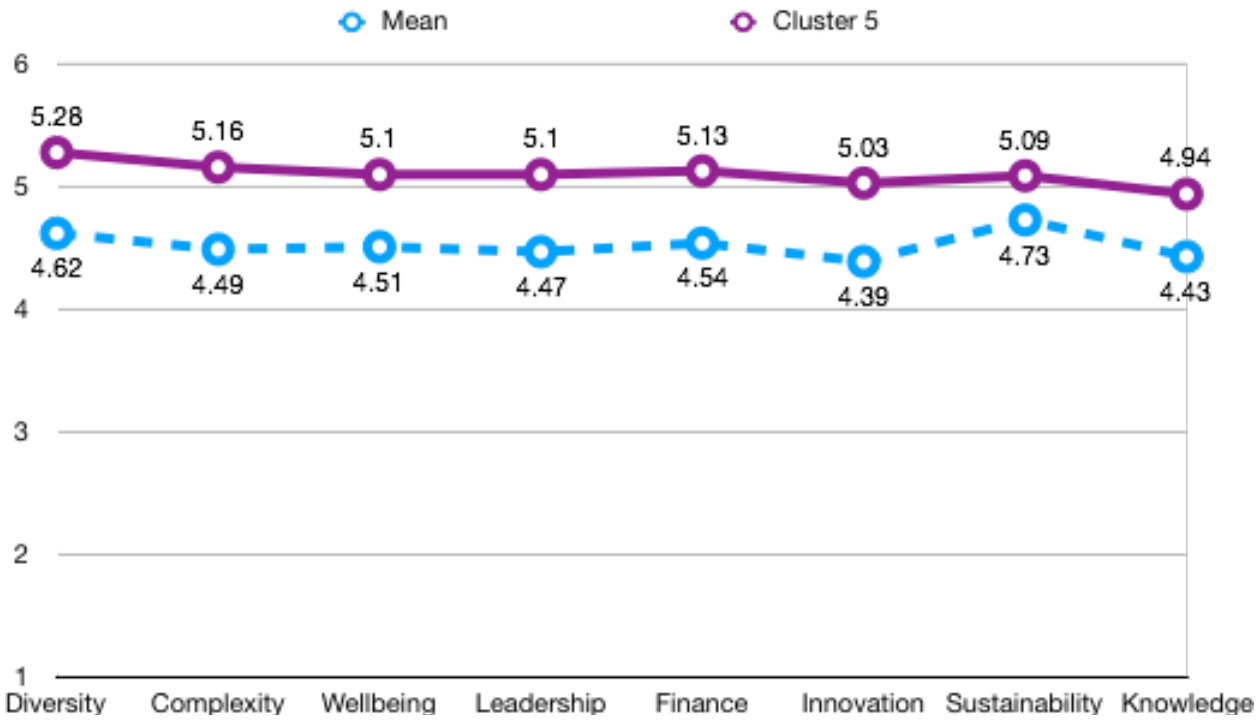

Figure 4.33: Cluster 5 mean scores

Inspecting the heatmap nodes in Figure 4.7 shows a similar pattern of emergence in the sustainability and complexity axes with warm colours spread across the top and central nodes in the cluster. The finance axis emerges with a similar pattern, except for the top right nodes which show cooler colours than the sustainability and complexity axes. The wellbeing and leadership axes show similar patterns of emergence with cooling of the nodes in the mid-right regions of the cluster.

The analysis focuses on the outlying demographic fields. There is a higher representation of junior management than in the overall sample, as can be seen in Figure 4.34.

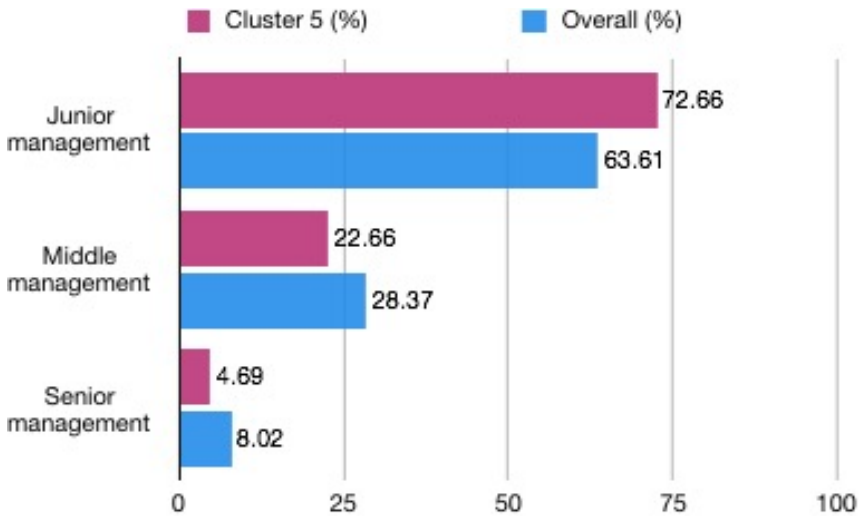

Figure 4.34: Cluster 5 management level (%)

Education levels also differentiate this cluster. The education levels can be seen in Figure 4.35. There is a higher representation of respondents from this cluster with a matric than in the overall sample. There is less representation of university graduates in this cluster. A more optimistic and less differentiated pattern of rating emerges with lower levels of education.

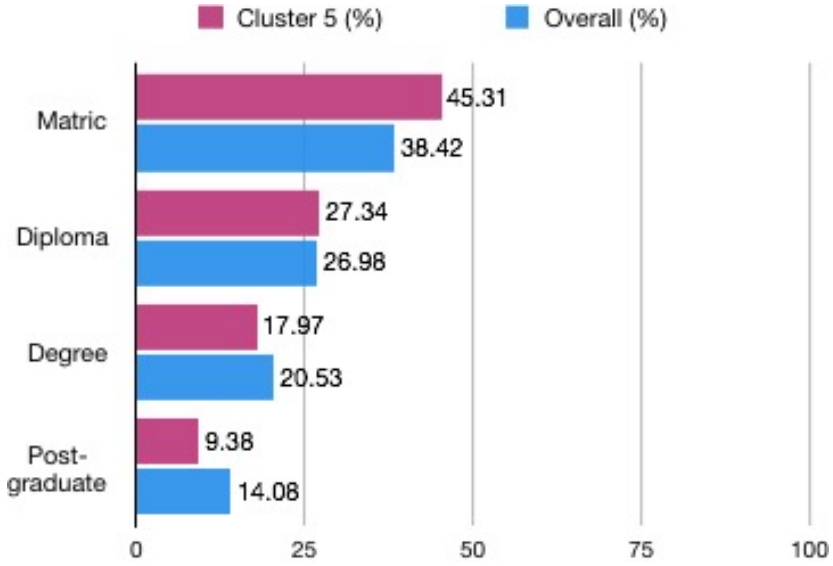

Figure 4.35: Cluster 5 level of education (%)

The age categories represented in Cluster 5 are indicated in Figure 4.36. Respondents in this cluster are more likely to be in the 18-24 age category, with a 7.02% higher representation than in the overall sample.

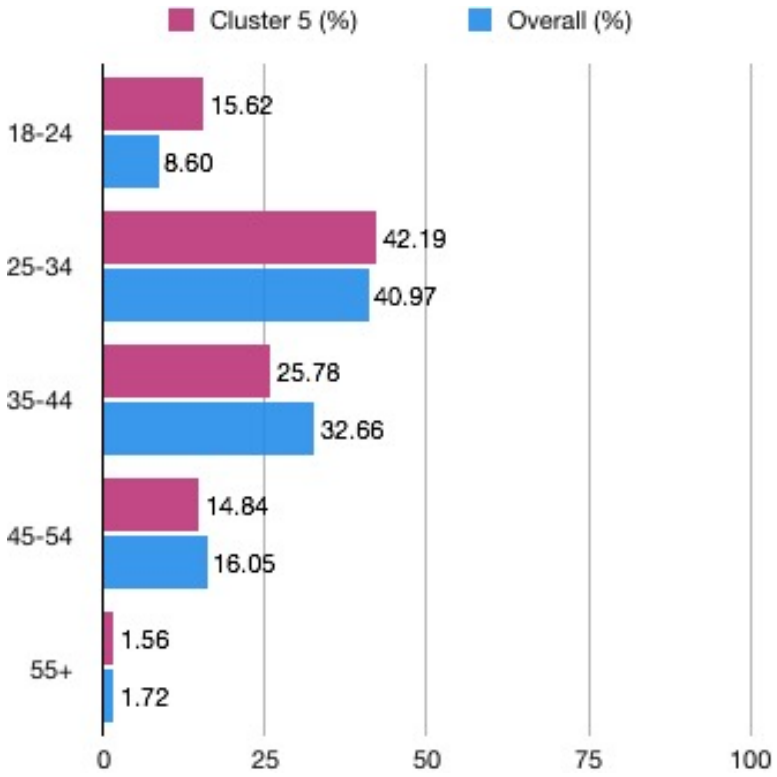

Figure 4.36: Cluster 5 age (%)

Respondents from this cluster are also more likely to be new to the organisation. The tenure of respondents in the cluster is displayed in Figure 4.37. The cluster has higher representation in both the <1 year and 1-2 years categories.

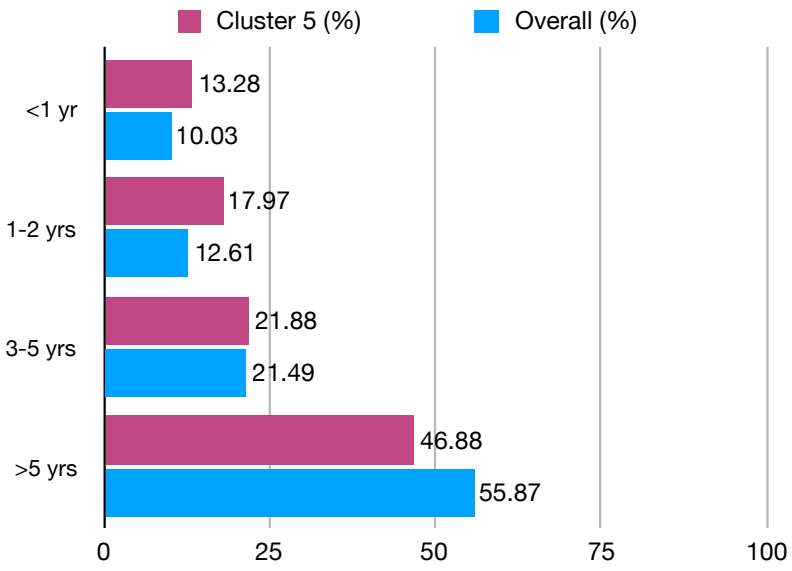

Figure 4.37: Cluster 5 tenure (%)

The cluster has a stronger representation from the Namibia business than the overall sample, as is displayed in Figure 4.38. The very positive view of this cluster is thus less evident when the group is viewed from outside the country.

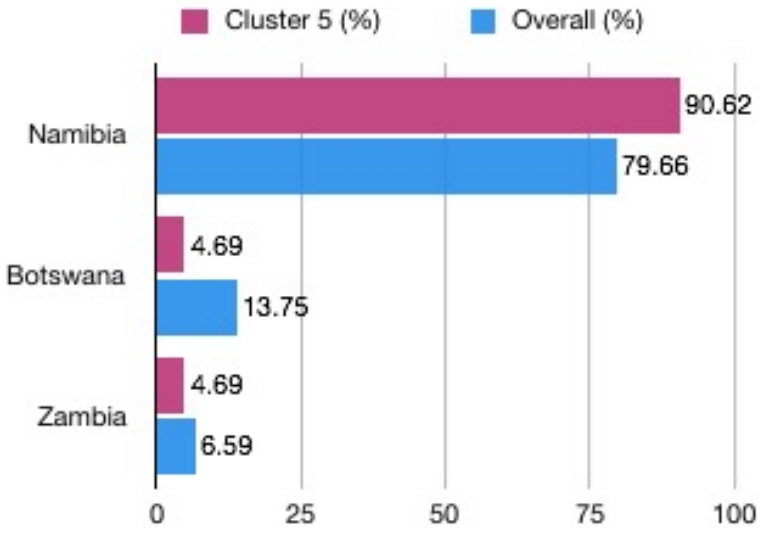

Figure 4.38: Cluster 5 country (%)

The cluster has a higher representation from the branch network (67.96%) than the overall sample (63.03%).

The composition of this cluster per division is displayed in Figure 4.39. Note the very strong representation from the retail bank. There is a moderate level of representation from many divisions within the head office structure. The two unnamed cells in the bottom right of the figure are group strategy and marketing.

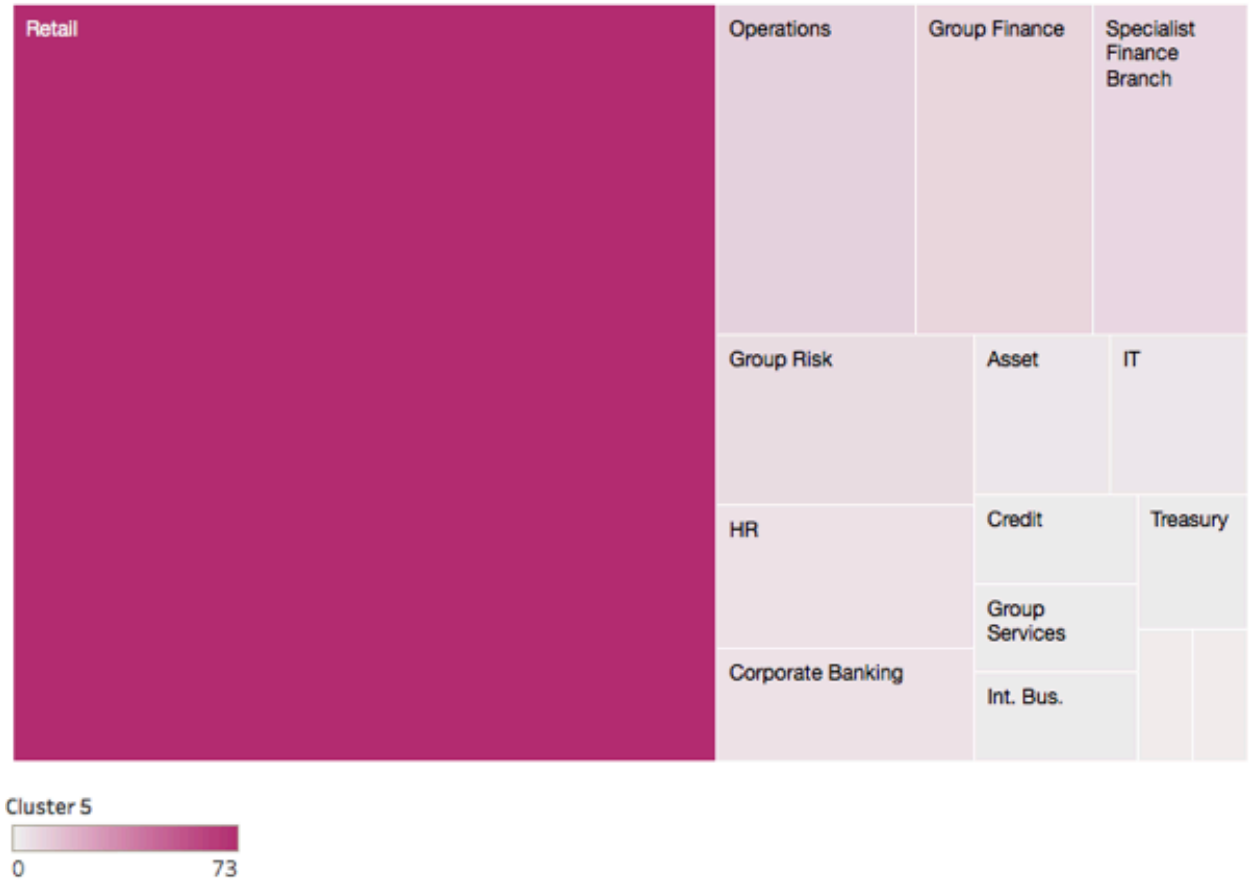

Figure 4.39: Cluster 5 divisions

This cluster has been named the “praise singers” as respondents from this cluster have very high ratings across all axes with subtle differentiation between axes. Praise singers have an important role in African societies - upholding the status of the chief through praise songs, providing critique on current affairs, and supporting a sense of membership of the chiefdom amongst the audience:

> “In African oral tradition, it’s the praise poet who reminds his people about their history and heritage. He’s a living archive with a remarkably retentive memory who is expected to recall royal lineages, praise names and the nation’s defining moments” (Mathe, 2016, para. 2).

Praise singers have important social functions that bear similarities with the role of court jester in Medieval Europe (Opland & McAllister, 2010). The praise singer and jester are liminal figures who seek to “add disorder to order and so make a whole, to render possible, within the fixed bounds of what is permitted, an experience of what is not permitted” (Kerenyi in Opland & McAllister, 2010, p. 165).

The conceptualisation of praise singer as court jester is a fruitful metaphor for the cluster as it provides a positive framing for this supportive position in a complex adaptive system, which has been carried around the world over many generations. Whilst this framing of the cluster might still be nascent given the young profile and representation at lower levels of management, there is potential for this role to add value to sustainability.

In considering the naming of this cluster, “naïve optimists” was initially considered. An integral approach incorporates multiple perspectives rather than attempting to determine which view is “correct”. This aligns with a complexity ontology which focuses on emergence through rich connections between agents in the system. The praise singer metaphor provides a positive framing of this cluster and a potential way in which this perspective can be further utilised in supporting the transition to a sustainable future.

4.3.13 Conclusion

The quantitative findings for case A have been presented. The application of self-organising maps was discussed and the resultant clusters were analysed. Five clusters were identified. The most optimistic clusters (praise singers and guardians), which play an important role in stabilising a complex adaptive system, together comprised 76.22% of the weighting. A very optimistic majority runs the risk of inhibiting progress towards sustainability. Sustainability was shown to be emerging alongside finance with dual zones of coherence. The progress towards sustainability was affirmed by the more critical clusters (devil’s advocate and the resistance) which both rated sustainability as a relative strength.

In the context of a pluralist epistemology, it is important to allow for the interpretation of the data from multiple perspectives. The qualitative strand of the research sought to achieve this. The chapter will now shift to examine the qualitative findings as a way of explaining and expanding on the quantitative results.

4.4 Qualitative findings

In an explanatory sequential research design, qualitative data are used to explain the quantitative results (Creswell, 2015). This section describes the implementation of the qualitative research design and presents the key findings of case A. The qualitative data are analysed to explain the patterns of emergence and coherence in the quantitative data. Stakeholder narratives are used to describe the journey to sustainability. Key dimensions of coherence are identified. Conditions and modes of emergence, which describe how corporate sustainability is enacted, are identified.

4.4.1 Sampling profile

The sampling criteria were discussed and collaboratively applied by the researcher, executive sponsor and key stakeholders. Purposive sampling was used to identify information-rich cases in which interviewees were well informed about sustainability (Creswell & Plano Clark, 2010; Etikan, 2016). Maximum variation sampling, a type of purposeful sampling, was applied. A broad spectrum of interviewees was selected in order to have a wide range of experiences and perspectives of the phenomenon (Etikan, 2016).

A total of 30 narrative interviews were completed with case A. Interviews were conducted in April and May 2018, with 18 interviews (60%) taking place in the larger Namibian business and 12 (40%) in the subsidiary in Botswana. The researcher was unable to gain access to the Zambia business due to operational pressures at the time. One recording of an interview failed, and only interview notes were included for the analysis of this interview. Several interviewees had worked in the Zambian business, so this was explored through the interviews and included in the findings. 24 interviewees (80%) were based in head offices whilst six interviewees (20%) were based in the branch network. Interviews were mostly conducted on voice-over-internet protocol (VOIP), and some over Zoom, a web conferencing application. The choice of format was determined by the bandwidth and availability of technology. Both formats allowed for good quality digital recordings of interviews.

Interviewees were invited by the executive sponsor to provide organisational context for the research and introduce the researcher. An informed consent form was provided together with information on the research, interview, and dashboard displays of the quantitative findings.

The demographic profile of the sample for this case is displayed in Figures 4.40 – 4.43. The aim was to achieve a diverse sample and to get the widest variety of views on sustainability. Since this case represented a group with multiple entities, the large proportion of “head office” informants came from a variety of entities within the group (retail bank, private bank, business banking, asset management, group). The sample was also diverse with respect to functional areas.

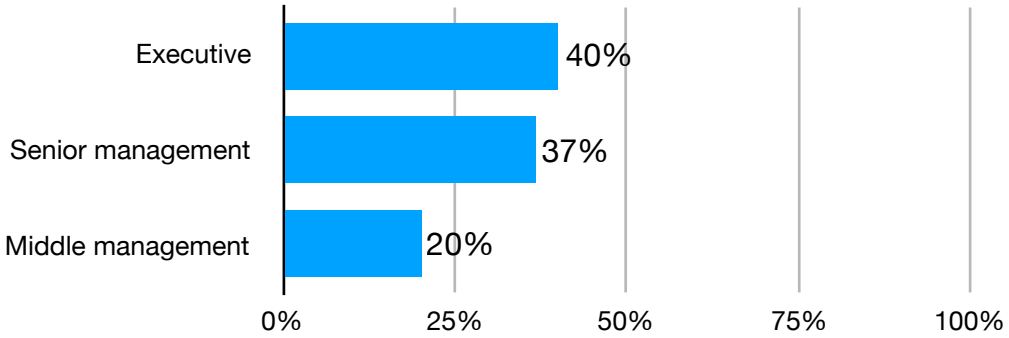

Figure 4.40: Management level

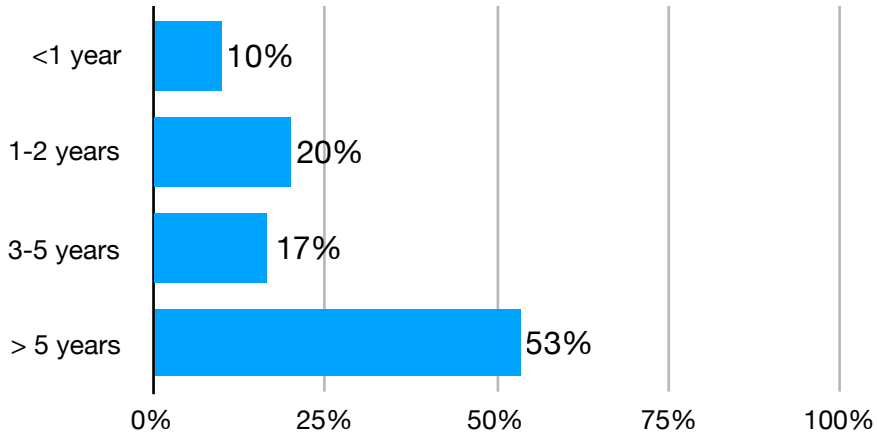

Figure 4.41: Tenure

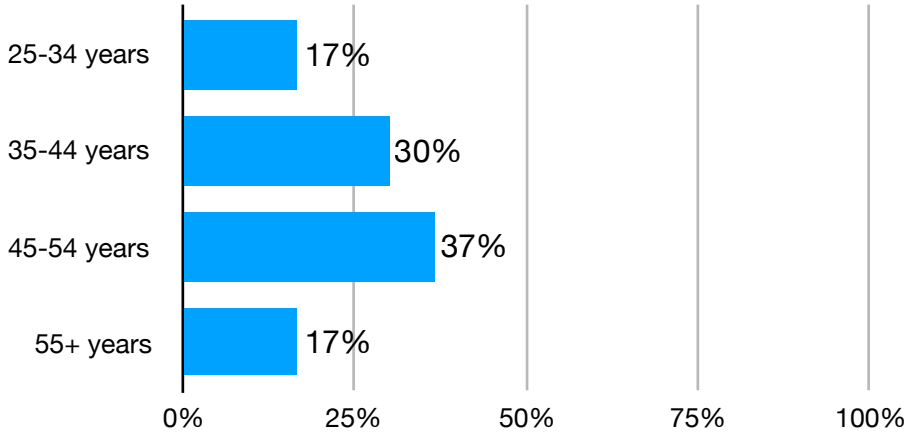

Figure 4.42: Age

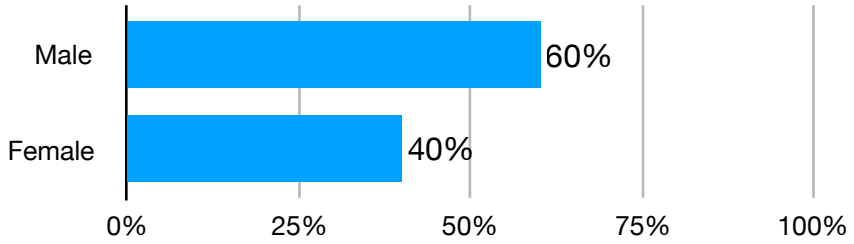

Figure 4.43: Gender

Key to the sampling was achieving a wide spectrum of perspectives on sustainability, and this meant working with interviewees that were supportive, as well as sceptical, of sustainability.

4.4.2 Transcription and data analysis

Each interview was transcribed verbatim and uploaded onto Dedoose for analysis. Demographic fields were linked to the transcripts on Dedoose, which enhanced flexibility in the process of data analysis. Codes were created to analyse embedded sustainability, embodied sustainability and conditions that enabled emergence of sustainability; the Hermeneutic circle approach was used. Coding was implemented separately for the Namibian and Botswanan data; the data were then analysed using Stake's (2006) cross-case procedure by collating and rating themes across each dataset and building a matrix to cross tabulate themes and findings.

4.4.3 Axiological development domain

This section reports on the qualitative results for the interior-collective integral domain (Wilber, 2001), which is the values domain of the Cassandra model. The domain has been named "axiological development" to emphasise values as an ongoing process of establishing and re-establishing a sense of what constitutes value in the context of the organisation. This section addresses both the dimensions of coherence and the conditions that enable emergence for the domain.

Axiology can be defined as the theory of values. Allen and Varga (2007, p. 20) argue that "values are aspects of human behaviour that emerged during evolution and gave us aims, goals and opinions which through our knowledge direct our actions. But conversely, our values create our intentions and desires, and these in turn drive changes in our epistemologies, since they determine what it is that we wish to achieve, and therefore what we seek to know in order to do this". Axiological development can be seen as part of an ongoing process in which the organisation co-evolves within its containing system.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. The first level was labelled embedded coherence, which refers to coherence between the firm and the systems in which it is embedded. The second is embodied coherence, in which sustainability emerges through embodiment at the level of agents in the system. Coherence at this level encourages self-organisation and emergence. The dimension of axiological signification was found to operate at an embedded level and the dimension of axiological resonance at the embodied level. Both dimensions are displayed in Table 4.5.

Level	Label	Definition
Embedded dimension	**Axiological signification**	The extent to which co-evolutionary axiological direction is compelling to stakeholders.

Embodied dimension	**Axiological resonance**	The extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent.

Table 4.5: Axiological dimensions

The dimension of **axiological signification** describes the extent to which the direction of axiological development is compelling to stakeholders. This dimension describes coherence at the embedded level of system, considering ways in which the firm co-evolves within its containing system. At the embedded level, signification provides a direction for ongoing axiological development as the organisation co-evolves with its containing system.

Of interest is that sustainability was integrated into the axiological framework without specifically referring to sustainability. The axiological framework was designed using a complexity approach, and thus can be seen to follow a similar perspective to Wells (2013), where the sustainability crisis is seen as an inability to think in a complex manner. An executive at the group describes the axiological framework as follows:

> "Now, when you look at our (Group) Way you don't have this heading that says 'sustainability'. We just have something that says, 'this is how we do things around here'. And that's part of our value system - we say we're aware of what's going on around us, we're aware of what our stakeholders expect from us and we respond to that. So being a 'connector of positive change' - that is our purpose" (AN15[12]).

Axiological signification goes beyond the typical simplistic identification of a static value-orientation that is then imposed on employees. Axiological signification allows for axiological plurality in the system where a coherent, rather than a uniform, approach is sought. As one senior manager in Namibia put it:

> "It's (sustainability) not just being done as a tick-box exercise - it's part of our ethos - it's who we are. It's interesting because our values and our behaviours all talk to

[12] Each interviewee was coded. The initial letter refers to the case, i.e. case A, and the second letter refers to the country, i.e. N = Namibia and B = Botswana. The number identifies the interviewee.

> sustainability. They don't use the word sustainability but if we acted in that way and we thought in that way, we would be sustainable" (AN5).

A slightly contrasting view came from another executive who indicated that the axiological framework wasn't intended as a sustainability initiative but rather positioned as such retrospectively:

> "First of all, the 'connector of positive change' and the 'catalyst of sustainable opportunities' came out of a brand project which was really designed to help us move into a monolithic brand, where we don't have different brands as we go into other countries. That is how it came about as opposed to coming about through the sustainability work which I'm going to talk about now. But fortunately, because we had already started the sustainability journey, it made a lot of sense when we started to talk about the brand positioning to look at sustainability as a theme" (AN10).

The axiological signification is not only about sustainability, but also provides a broader view of the organisation which includes sustainable co-evolution with its containing system. There was a similar view from the Botswana operation. As one executive put it:

> "With the 'connectors of positive change', I strongly believe that the behaviours in an indirect way contribute towards sustainability so there's been a lot of work, again, on that (Group) Way - on entrenching this new culture that we're talking about. This journey we only started last year so we are still building on it and it is going to take a bit of time to get the culture going and what we've actually done now is to say: let's focus on three behaviours for this particular year - so every year we'll focus on the three behaviours and these behaviours actually speak to sustainability" (AB5).

Axiological signification thus seems to have been effective in both the holding company and subsidiary. Signification was seen by respondents to be more prominent in the head offices than branch networks.

The dimension of **axiological resonance** describes the extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent. When embodied there is resonance - axiology is experienced as a "felt sense". Located within the values domain of Cassandra, this is the embodiment of a collective-interior attribute of the organisation. The concept of "felt sense" captures the notion of embodiment as a "holistic,

implicit, bodily sense of a complex situation" (Gendlin, 1996, p. 58). Axiological resonance is thus experienced in such a way that it becomes embodied not only in the mindset, but also in the implicit responses of the agent.

This approach was acknowledged as critical within this case. Interviewees reported the importance of an approach in which sustainability initiatives are entrenched in a holistic way within the employee, resonating with, and becoming part of, the axiological framework of the employee. An executive in Namibia described this:

> "I think the idea that you drive - I think policy at least sets intent but I don't think that you can really manage it from a sort of committee and policy perspective - get a sustainability officer and this person must drive the entire sustainability theme for the Group. I don't actually think it works like that. So I would break it down - for me everything comes down to entrenching behaviour - there's no point in, for instance, setting up motion monitors in a room that turns the lights off when there's no-one there. That's not, in my mind, sustainable because when the person goes home, he doesn't have that in his house, so he never learns to switch off a light if he's not using it. That's probably, for me, the key area of success is if you're not going to really change behaviour and focus on initiatives that speaks to achieving that goal then, from a Group perspective, we only can do really well on paper" (AN13).

This line of argument supports an approach in which sustainability emerges through co-evolutionary self-organisation. Axiological resonance creates coherence between the axiological framework of the employee and organisation. This coherence provides a collective sense of value yet is open enough to set the stage for symbiotic relationships. An executive in the Namibia business emphasised the importance of this approach for the younger generation:

> "The younger generation want to live in an environment which is much more fluid. They don't want to have meetings about sustainability, they want to go out and engage with the community and feel that they are adding value. So what I think happens is you step into the organisation, you're looking for purpose, you believe you're going to find a purpose here or you're going to find that you might have a purpose already and you're looking for an organisation that helps you to fulfil that purpose you have in life, part of which might be different levels of caring for society and the environment and you come into the organisation and you expect to find those things here" (AN15).

This view emphasises axiological resonance as a holistic endeavour which affects the employee beyond his or her work role and professional identity. It involves direct experience and involvement on a personal level. A manager from the branch network in the Namibia business cautions, however, that whilst substantial efforts have been made in the business to trigger axiological resonance, there is still some way to go to see this realised:

> "And currently we're (the Group) going through the process of trying to change people's attitudes and culture to make them see that all the different - there are different ways of getting to be 'connectors of positive change'. I don't think we're there yet, I don't think that we're near the new type of culture that they'd like to see within the bank" (AN18).

Reflecting on the quantitative data, a senior manager in the Group interpreted the predominance of clusters with positive ratings as a receptiveness that has been created amongst employees:

> "I think it (the predominance of clusters with positive ratings) changes the way we need to look at people within the organisation and the way we try to almost sell them new ideas and, for instance, the (Group) Way. We take for granted that people are going to push against it and not want to embrace it and if you take that approach you almost give people licence to behave in that way. They see that you expect them to kick back and so they do. Whereas if we go with on a premise that people are pretty positive about wanting a sustainable organisation, wanting wellbeing and believing that leadership actually, overall, are doing a pretty good job, then it changes the way you approach them - as positive influences, rather than blockers" (AN5).

In the Botswanan entity there seemed to be more challenges associated with axiological resonance. Interviewees reported a perception of increased distance from the axiological development process. This echoes the higher representation from both subsidiaries in the more critical clusters in the quantitative results. As an executive from the Botswanan entity put it:

> "I found it (axiological framework) to be very aspirational - I wasn't too clear at first what exactly that means in tangible terms to be 'connectors of positive change'. Internally, yes, you can draw some inferences to say that - okay, maybe some internal activities like CSI that's been connected to positive change but how that links to (Botswanan

entity) and Botswana, in general, is not too clear - so for me it still seems quite aspirational. The specific activities that drive that message hasn't come out yet. Maybe it's part of the roll out plans, but how we are connectors of positive change in Botswana - certainly there's a gap there" (AB2).

In summary, axiological resonance was strongly positioned as important by interviewees, yet many interviewees perceived the need to work on this aspect both in the holding company and subsidiaries. Axiological resonance was more strongly perceived in the head office structures than branch networks.

Condition and mode of emergence

This section discusses the axiological condition that enables the emergence of sustainability, and then goes on to consider the axiological mode by which sustainability is enacted. Both the condition and mode refer to the axiological enactment of sustainability and are displayed in Table 4.6.

Level	Label	Definition
Enactment condition	**Axiological frame**	An axiological frame is a shared perceptual lens which constitutes what is perceived as valuable.
Mode of enactment	**Axiological coalition**	A coalition of agents who enact sustainability via the activation of a shared axiological frame.

Table 4.6: Axiological enactment

The presence of an **axiological frame** is a condition of emergence that allows for an axiological coalition of agents to enact sustainability through a shared perceptual lens which constitutes what is deemed valuable. The need for an axiological frame was emphasised by employees' reluctance to "own" the sustainability portfolio within particular functional areas in the business. This was partly a function of the unfamiliarity and vastness of sustainability as a portfolio. As a middle manager in Namibia described it: "When something is a new concept - I think when people think about sustainability they think it's not for me, it's for someone else out there" (AN6). There was a recognition that positioning sustainability as a responsibility of a

particular functional area missed the point, since sustainability as a co-evolutionary process affects the entire business. A senior manager in Namibia put it as follows:

> "It's (sustainability) not one of those things that you push into a space. It's not owned by one person or one department. There's push back around that to say that we don't feel that we should own it" (AN5).

The axiological frame was perceived as a holistic orientation that related to both work and personal spheres. Importantly, it was positioned as a cultural element that includes, but can't be reduced to, key performance indicators (KPIs). There was a sense that there was still work to do for sustainability to be enacted in the business. As one senior manager in Namibia noted:

> "Basically, breaking it down into how as an individual can I be sustainable in my own personal life? I think that helps to create an understanding of what sustainability actually is. It's not a 'thing', it's a culture and there are 'things' that we measure - the KPIs but the KPIs can only be measured on stuff that is actually being done in the organisation. You can't suck those things out of your thumb" (AN5).

Interviewees commented that the Botswanan subsidiary was still in the early stages of familiarising employees with the axiological framework, and thus the axiological frame was less evident than in the Namibian business. As an executive in Botswana noted:

> "This journey we only started last year so we are still building on it and it is going to take a bit of time to get the culture going and what we've actually done now is to say: let's focus on three behaviours for this particular year - so every year we'll focus on the three behaviours and these behaviours actually speak to sustainability" (AB5).

The axiological frame is still nascent across the Group but less so in Namibia. The axiological emphasis in the business has been on signification. This is largely to be expected, since the journey to sustainability in the Group is relatively new.

Axiological coalitions were identified as the mode through which the axiological domain of sustainability was enacted. This is a coalition of agents who enact sustainability through collaboratively activating a shared axiological frame. The agents are able to work in concert through the use of shared perceptual lenses which provide a coherent determination of what is valued. This was pivotal in launching sustainability initiatives in the Group. The axiological

coalition enabled sufficient passion, commitment and tenacity to gradually create an appreciation for the need for sustainability in the business.

An executive in the Namibia business described the initial process and the centrality of an axiological coalition, which started with just two executives who had adopted a shared axiological frame. Note that it was the axiological frame and not technical expertise in sustainability that enabled the emergence of sustainability. An executive based in Namibia expressed the process as follows:

> "When I joined the Group I met somebody, a colleague in the Group, who was very passionate about sustainability. Of course, both of us, in our professional careers - we had exposure to sustainability as a necessity within business through courses that we'd done, not necessarily as a formal practice within the organisation. So, with that little bit of background on sustainability, we put together a paper which we submitted to the executive management team about sustainability to encourage dialogue on the topic and to see if we could spark the initiation of some sort of internal sustainability initiative and I distinctly remember the first time that I submitted the paper, the chairman of the executive team at that time said there was no time for that and that we won't discuss it. So I think that sort of gives you some idea of the appetite for sustainability that existed in 2012" (AN15).

The impact of the coalition was only seen once a critical mass had been established that was able to effectively influence the system. The same executive commented:

> "Conceptually, I think what started to form was a coalition, if you will, of senior people that felt we needed to bring sustainability as a topic to the fore and that there needed to be more dialogue around it. Now that continued throughout 2013 and in April 2014 there was a sufficient critical mass of senior executives who felt we needed to look seriously at sustainability" (AN15).

Inspecting the clusters in the quantitative data shows remarkable progress towards sustainability across the group. This can be seen in the points of coherence which are most obvious across clusters in the finance and sustainability axes. As a financial services institution, coherence in the finance axis is more likely, and perhaps to be expected. The emergence of a second point of coherence in the sustainability axis can be interpreted as

substantial progress in a short period of time. Cluster 4 (the resistance), the cluster with the most critical view, may demonstrate this progress since this cluster gives progress towards sustainability its highest score. This cluster is likely to be comprised of employees who serve as change agents in the system. The cluster weight of 8.88% of the population suggests substantial development of the axiological coalition.

In summary, the axiological frame was most evident in the Namibia business but not observed in the Botswana business, and was perceived as a holistic orientation that related to both work and personal spheres. The axiological coalition was only referred to in the context of the Namibian entity; it started with two executives and gradually developed to a critical mass, which was able to influence the Group.

4.4.4 Semiotic development domain

This section reports on the qualitative results for the individual-interior integral domain (Wilber, 2001), which is the personal development domain of the Cassandra model. The personal development domain was repositioned as semiotic development since the essence of personal development was found to be associated with shifting the perception of what is considered personally meaningful to agents. The domain addresses individual-interior aspects of organisations, namely the personal development of agents in the system. This section covers both the dimensions of coherence and the conditions that enable emergence for the domain.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. Semiotic symbiosis was the dimension identified at the embedded level, and semiotic embodiment was identified as a dimension operating at the embodied level. Both dimensions are displayed in Table 4.7.

Level	Label	Definition
Embedded dimension	**Semiotic symbiosis**	The extent to which what is considered as personally meaningful is enriched by symbiotic interaction with the containing system.
Embodied dimension	**Semiotic embodiment**	The extent to which sustainability is personally meaningful and implicit.

Table 4.7: Semiotic dimensions

The dimension of **semiotic symbiosis** describes the extent to which what is considered as personally meaningful is enriched by symbiotic interaction with the containing system. Positioning meaning-making semiotically, as a system of signs, acknowledges that semiotics is in itself a complex system (Cilliers, 1998). Charles Sanders Peirce explained a sign within a triadic relationship between sign, object and interpretant:

> "I define a sign as anything which is so determined by something else, called its Object, and so determines an effect upon a person, which effect I call its interpretant, that the latter is thereby mediately determined by the former" (Peirce, 1998, p. 478).

The interpretant is key in reaching an understanding of or translating the sign/object relation. In the case of semiotic symbiosis, the translation of signs and meaning can be seen in the context of the agent being embedded in symbiotic relations with the containing system. When agents interact in a symbiotic manner, they create long-term relationships with diverse agents, stakeholders and the containing system.

The term symbiosis was originally coined by Anton de Bary in 1879 to describe associations between different species, and can be defined as a "persistent mutualism" (Douglas, 2010, p. 6). Whilst there are different types of symbiotic relationships, all types allow for organisms to evolve together. Symbiosis is thus a useful concept to describe embedded system interactions in this domain. This dimension is located within the personal development domain of the Cassandra model at the level of embedded coherence.

Semiotic symbiosis came through strongly in the Group's ethos (axiological signification). As one executive remarked, "we see ourselves as connectors of positive change. What that means is that we see that we connect people with opportunities at a very individual level" (AN15). It is interesting that the axiological signification emphasises semiotic symbiosis, encouraging meaningful engagement with stakeholders as opposed to transactional exchanges. However, several respondents noted that this was still aspirational.

Whilst the quantitative data showed the majority of respondents rated the organisation highly with regard to sustainability, the interview data suggested that whilst sustainability frameworks and policies were well-developed, a lot of work still needed to be done to support implementation (AB3, AN5, AN6, AB10). One senior manager noted:

> "The last couple of years they've started to change, to look at the human side as well as the business side and as well as the environment that we operate in. And currently we're going through the process of trying to change people's attitudes and culture to make them see that there are different ways of getting to be connectors of positive change. I don't think we're there yet" (AN18).

There was a similar view in the Botswana operation, in which progress was perceived to be restricted to the Namibian entities. A regional manager commented:

> "Personally I think that on paper it's good, but the practical experience and implementation is falling short. Sustainable growth is still a paper-based idea - it's nicely contained in a little booklet, defined and I think going that route and implementing it is still something that needs a lot of work, from my perspective. I think the Group, itself, will say they're quite far advanced - maybe so, in terms of planning, but if you go to a retail branch and you ask them what makes you sustainable? What is necessary? What do you need to deal with or change to be sustainable then, on average, very few people will be able to give you an answer or indicate what has actually been implemented or done" (AB10).

Whilst the capacity to act symbiotically is well supported by the axiological signification, how this is implemented within the semiotic structures of agents was less evident to agents both in the parent company and subsidiaries.

The dimension of **semiotic embodiment** describes the extent to which sustainability is personally meaningful and implicit. At a biological level, all creatures can be described as semiotic systems with genetic codes (Barbieri, 2008), yet at the level of meaning-making, Peirce suggests that "concepts are mental habits, habits formed by exercise of imagination" (as cited in Nöth, 2016, p. 41). Habits, according to Peirce, are either physical, mental or a combination of both, and there are also habits of feeling (Nöth, 2016).

Embodiment recognises that the mind emerges from multiple interconnects between brain, body and environment (Thompson, 2007). For sustainability to be enacted, capacity needs to be developed through "changes in cognitive mechanisms mediating how the brain and nervous system control performance and in the degree of adaption of physiological systems of the body. The principle challenge (is) to induce stable specific changes that allow the performance to be incrementally improved" (Ericsson, 2006, p. 700). What is considered as meaningful therefore becomes embodied in the organism through ongoing habits and practices that enable a suitable performative capacity to be developed.

This view was presented by interviewees. An executive based in Namibia illustrated it by discussing the limitations of an approach based on sustainability training:

> "In my view, teaching people about sustainability as a theory does not pay off. I believe one has to start within the organisation with the basic practices of caring, caring about the environment in simple practices, recycling, caring about water. It starts with that and once that takes root in the individual then sustainability becomes real throughout the whole organisation. So it has to eventually become an inside out approach - and you have to teach that to people. If you've never learnt what caring for the environment is about, that's the basics you have to start within the organisation" (AN15).

The semiotic embodiment of sustainability was positioned in a holistic manner. There was a recognition of the need for embodiment across multiple roles agents play, both in their work and personal contexts. An executive based in Namibia stated that "we're not going to change the light bulbs, we're rather going to change the minds" and then elaborated:

> "We can put on motion sensors, we can put in LED lights, we can have water efficient toilets and solar panels on the roof and from a Group perspective we can decrease our carbon footprint and it would be nice to show. But we wouldn't really have impacted

> the world at large because once our staff leave they don't implement the same type of things at their homes, so you don't get the same saving there so it's not sustainable. You don't entrench the idea of why these types of things are important, so they don't influence their friends and family to do similar types of things" (AN13).

This conceptualisation of semiotic embodiment of sustainability is valuable since it considers agents as they operate across multiple systems, thereby creating a wider sphere of influence. A similar view was put forward by interviewees in the Botswanan entity, yet several interviewees commented about a general lack of awareness of sustainability amongst staff. One executive in Botswana discussed the importance of a conscious approach:

> "The (Group) Way in a round-about way is actually contributing towards it (sustainability) but the inhibitor for me would maybe be the lack of clarity, that is for everyone. So that it's an unconscious thing we are doing where you end up in a place that you don't really plan to be in. It might be a good place, but this was not your plan, so it needs to be conscious. So even when I'm doing what I'm doing, I'm consciously doing it and I know that I'm contributing towards sustainability" (AB5).

The dimension of semiotic embodiment was emphasised by interviewees across the group and has been integrated into the axiological framework and overall ethos of the business. However, it remains somewhat aspirational in the Group, and particularly so in the subsidiaries.

Condition and mode of emergence

This section discusses the semiotic condition that enables the emergence of sustainability, and then goes on to consider the semiotic mode by which sustainability is enacted. Both the condition and mode refer to the semiotic enactment of sustainability and are displayed in Table 4.8.

Level	Label	Definition
Enactment condition	**Semiotic intention**	Semiotic intention is the extent to which active engagement in sustainability is driven by a sense of personal meaningfulness.
Mode of enactment	**Semiotic refraction**	Semiotic refraction is the process of perceiving a differentiated view of a multiple object using a sign.

Table 4.8: Semiotic enactment

Semiotic intention is a condition of emergence in which agents are driven to engage in sustainability initiatives because of a sense of personal meaningfulness associated with these activities. This brings together the embedded and embodied dimensions in this domain where the semiotic structure of interpretation used by agents has been enriched by interaction with the containing system and embodied through refining habits of thinking, feeling and practice. The condition of semiotic intention leaves the agent poised to identify opportunities to enact sustainability, propelled by a sense of meaningfulness and recognition of the inherent value in the activities. Whilst recognised by interviewees, this condition remains an issue in the Group, and pointed out by a senior manager based in Namibia:

> "What I think we're missing is where we take sustainability, and we don't focus so much on the word, we focus more on the intent behind the word. It's hard to explain, but I think sustainability has become this big thing and no-one wants to hold it or carry it, because they don't actually know what to do" (AN5).

Several interviewees commented that all too often there is an absence of intent to address sustainability. A manager in the branch network in Namibia demonstrated why a semiotic basis for intent is important:

> "I think it's easier for people to put their heads in the sand as long as their lives and their self and their position is safe and they're carrying on, they're just too comfortable to want to change. If it's not physically or directly affecting them, they've got so much going on in their lives that they just couldn't be bothered" (AN18).

A branch manager based in Botswana recounted how axiological signification in the business prompted a holistic personal reflection, which supports the development of semiotic intentionality:

> "The statement ('connector of positive change') made me reflect a bit because the moment that you talk about being a 'connector of positive change' then you have to think about - What are my goals? What do I want to do? What do I want to reach? And what I want to reach - is that going to make me a connector of change? And if I do that and I do it in my personal life and in every aspect of my being - is that going to contribute to my own happiness, as well as those around me? It's opened up a lot of thoughts in my head and I think it's a good thing" (AB9).

This illustrates the linkages between the integral quadrants, as well as how a holistic approach has the potential to shift the way in which sustainability is enacted across multiple contexts in which the agents operate. Whilst this is promising, another senior manager in Botswana pointed to a disjuncture between semiotic intentionality and a short-term view in the Botswanan entity:

> "I think, at this stage, maybe I put profit above sustainability - it's a short-term view but that's the indication you get when you come with innovation and new ideas that may not show immediate financial rewards but long-term it will definitely contribute to sustainability" (AB10).

In this example there is semiotic intentionality that is frustrated due to the axiological or operational context. Perhaps further focus on semiotic symbiosis would have enabled this interviewee to create a different outcome. Another approach would have been to build an axiological coalition.

Semiotic refraction was identified as the mode through which the semiotic domain of sustainability was enacted**.** Semiotic refraction is the process whereby agents have a differentiated view of sustainability, as a multiple object, when perceiving it using a sign. The metaphor of semiotic refraction is used as it draws on the triadic relationship between sign, object and interpretant (Nöth, 2016). To enact sustainability, the agent perceives by means of a sign. The sign is used to view the object. Since sustainability as a complex set of phenomena is ontologically plural, the sign is "refracted" and perceived as differentiated by the agent. This

differentiation offers the potential for novelty to emerge. It must be remembered that the systems of signs, objects and agents are all complex systems which recursively interact (Cilliers, 1998; Morin, 2008).

There was an example of semiotic refraction from an executive based in Namibia who reflected a nuanced understanding of the implementation of corporate sustainability. He drew on a cultivation metaphor which illuminated the process of emergence in a complex adaptive system. This shows how a more traditional mechanistic view of change is refracted and seen in a more dynamic and emergent way:

> "One can see this as planting the seed– cultivating a new topic (of sustainability in the business), is not like building a house, it's more like cultivating a garden. When you build a house, you can build according to that plan, and manufacture to specification. Cultivation of new ideas doesn't work like that. You need to be dynamic and patient, working with people's thinking. If a branch doesn't grow out exactly how you wanted to, you can't cut it off completely, you have to plan how bend it in the right way. It's a fluid process of establishing new ideas. You have to be very fluid" (AN15).

The similarity between scores across the axes, that is, the lack of a differentiated view in the quantitative dataset, perhaps suggests a need for greater semiotic refraction. It was clear from the interviews that there is a perception in Namibia that working for the Group, being the largest Namibian-owned financial services company, is linked to a sense of national pride. There is, however, too little differentiation between axes to provide clear evidence of the active use of semiotic refraction; this may be due to the relatively recent introduction of corporate sustainability initiatives in the Group.

An executive reflected on previous work experience in the Zambian entity which implemented extensive solar solutions in response to protracted interruptions in electricity in the country. This quote illustrates the local and contextual nature of semiotic refraction, and how this supports emergence:

> "So there's definitely a big opportunity in the various countries to operate and make it happen and we've implemented a lot of things in (the Zambian entity) that Group was learning from us and that's the thing the important part - that we're not puppets, we've got a brain, we've got energy, we've innovation, we've got all the capabilities around us

and we must make it work ourselves, as well, and not wait for (the Namibian entity) to come up with a project or framework" (AB7).

Semiotic refraction represents a key advantage in that it provides insights that enable co-evolution by sharpening perception and encouraging novelty. Notice that this example emerges in a subsidiary and is not associated with centralised planned change. There is a link between the cultivation metaphor and the Zambian example which demonstrates semiotic development.

In summary, the semiotic domain was recognised both in the holding companies and in the subsidiaries. The embedded and embodied dimensions were evident; the enacted condition and mode were recognised but not as evident in the business.

4.4.5 Co-evolutionary performance domain

This section reports on the qualitative results for the individual-exterior integral domain (Wilber, 2001), which is the mechanistic performance domain of Cassandra. It should be emphasised that for sustainability to be enacted, mechanistic performance is repositioned as co-evolutionary performance. Whilst mechanistic approaches to management still apply to this domain, they contribute to co-evolutionary performance.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. Co-evolutionary value was the dimension identified at the embedded level, and co-evolutionary practice was the dimension identified at the embodied level. Both dimensions are displayed in Table 4.9.

Level	Label	Definition
Embedded dimension	**Co-evolutionary value**	The extent to which value is simultaneously created for the organisation, stakeholders and containing system.
Embodied dimension	**Co-evolutionary practice**	The extent to which co-evolutionary activities are embedded in the agents' regular business practices.

Table 4.9: Co-evolutionary dimensions

The dimension of **co-evolutionary value** describes the extent to which value is simultaneously created for the organisation, stakeholders and containing system. The qualitative data suggest that financial services institutions find themselves in a rapidly changing environment in which fintech and disruptive technologies threaten current revenue models. Sustaining performance requires value creation as part of an ongoing and dynamic co-evolutionary process. This concern can also be seen in the quantitative dataset. Many interviewees commented on the relevance of the outlying cluster 3 (pivots) which had an extremely low innovation score. Whilst this cluster only comprised 0.86% of the population, many interviewees perceived this as a very real concern in the business. It came up in several interviews and is well described by a group executive based in Namibia:

> "I believe it is important for sustainability that we are and remain innovative to the extent that you can foster what we'd like to call here an idea-driven organisation - it is probably the pinnacle of being sustainable. So we're doing a lot of work in that trying to establish an idea-driven organisation. We have a program currently that we're piloting and hoping to roll it out to the organisation over the next couple of months" (AN9).

Without survival of the business in mechanistic terms there is no scope for sustainability. As climate change impacts alongside technological disruption and other dynamics, business as usual is likely to become increasingly difficult. There was a pronounced recognition of this in this case, and inspection of the quantitative data emphasises the role of more critical clusters of agents, such as cluster 4 (the resistance). Remember that this cluster profile had higher levels of education, representation from middle and senior levels of management and representation from Botswana and Zambia. Co-evolutionary value creation is not static, but

responsive to market dynamics, thus requiring the business to influence majority clusters less critical and perhaps even less aware of, or interested in, these dynamic contexts.

Membership of international bodies such as the United Nations Global Compact has supported co-evolutionary performance through "helping us to take it (integrated reporting) a bit more seriously as we are reporting globally" (AN14).

Interviewees from the Botswana business expressed difficulty in selling longer-term ideas into the business. One executive commented:

> "I think, at this stage, maybe profit I put above sustainability - it's a short-term view but that's the indication you get when you come with innovation and new ideas that may not show immediate financial rewards but long-term it will definitely contribute to sustainability" (AB10).

An executive from the Botswanan entity identified a co-evolution issue relating to the "bank having the image of being a positive contributor to the national economy, or somehow tied to financing activities that benefit the local communities, or profits that are retained in the country in which they operate and not just taken to the holding company" (AB2). The business thus needs to be perceived as contributing meaningfully to the containing system. It was interesting that whilst the subsidiary status was perceived as a risk in the above quotation, several other interviewees spoke about the advantage of being perceived as part of a larger group in the market in creating trust in the market.

The dimension of **co-evolutionary practice** describes the extent to which co-evolutionary activities are part of an agent's regular business practices. The importance of co-evolutionary practice goes beyond the implementation of sustainability to considering *how* the agent engages in practices that assist to create embodied cognition, thereby increasing the ability of the agent to come up with novel responses to sustainability challenges and opportunities. The mindful application of co-evolutionary practice is a conscious and deliberate attempt to contribute to sustainability.

Studies in neuroscience demonstrate the importance of mindful application of co-evolutionary practices. Since the brain uses a relatively large amount of available metabolic resources in the body, it has evolved to function in a way that minimises metabolic load (Rock, 2009). The

prefrontal cortex is involved in functions used for work activities, namely understanding, memorising, recalling, deciding and inhibiting (Rock, 2009).

The prefrontal cortex evolved more recently and is therefore less efficient than older parts of the brain, in evolutionary terms. To economise on metabolic resources, activities that are routine in nature function from the basal ganglia, which is an evolutionary older and more efficient part of the brain (Rock, 2009). As new skills and routines are embodied, these become less conscious, and have been referred to as “unconscious competence” (Cannon, Feinstein, & Friesen, 2010). Since the containing system is dynamic and the transition to a sustainable future is vast, change driven by procedures and processes, whilst important, is not sufficient. Co-evolutionary practice, therefore, can be seen as necessarily including a mindful and dynamic ongoing effort to apply co-evolutionary activities. This was recognised as part of the way in which the Group approached sustainability. According to an executive in Botswana:

> “It’s not an unconscious thing we are doing where you end up in a place that you don’t really plan to be in. It might be a good place but this was not your plan, so it needs to be conscious. So even when I’m doing what I’m doing, I’m consciously doing it and I know that I’m contributing towards sustainability” (AB5).

Csikszentmihalyi (1993) proposes that agents contribute to co-evolution through complexification of consciousness through differentiation and integration. This brings together, in a co-implicative manner, semiotic embodiment where integration is achieved through “adding meaning to experience” and co-evolutionary practice where differentiation occurs through “learning something new” (Csikszentmihalyi, 1993, p. 166). Co-evolutionary practice is a conscious and deliberate approach in which practices become embodied in the agent. This requires that it is prioritised. One middle manager based in Namibia commented that sustainability is often deprioritised in meetings:

> “As I mentioned, the agendas are fully loaded so they tend to skip the sustainability section or just briefly discuss anything” (AN17).

Whilst co-evolutionary practices don't seem to be perceived as entrenched, there have been efforts to integrate sustainability into business policies and procedures. These can be seen as necessary but not sufficient in building coherence of co-evolutionary practice. An executive based in Namibia commented when referring to credit and financing policies:

> “In terms of planet, we have a lot of policies around how we fund the type of businesses and industries that we finance and that we’d like to do business with, who are responsible in their own rights towards the planet. These things are live processes - they’re being looked at on a daily basis and applied on a daily basis. It’s not something that’s painted on the wall and once a year we look at it and tap ourselves on the back. It’s applied continuously in the business" (AN9).

Another executive in Namibia, when discussing the integration of sustainability into credit assessment, pointed out a need for further integration:

> “I don’t believe that it’s entrenched into even the transactional business or investment business that we provide for customers as well. But I don’t think it’s entrenched in the total business yet” (AN8).

Interviewees from the Botswanan entity also recognised the need for co-evolutionary practice but perceived the implementation thereof to be lacking. An executive based in Botswana commented:

> “I don’t think we’re there yet. I think we’re still learning and reporting and maybe reporting because we need to report, but not so much fully understanding why we’re doing it. I also think it’s quite level in the sense that you’ve got your key result areas and maybe your key result indicators also get exposed to it, but I don’t think the whole system understands or appreciates the whole sustainability program that Group has embarked on but a lot of work has been done, a lot of good work has been done and we are reporting but I don’t think it’s built into the culture yet” (AB5).

The co-evolutionary practice dimension was thus well acknowledged across both the holding company and subsidiaries. There was recognition of a good start having been made in the formal integration of sustainability into policies and procedures in some areas of the business, but a widespread belief that this had not filtered into broader co-evolutionary practices of agents.

Condition and mode of emergence

This section discusses the co-evolutionary condition that enables the emergence of sustainability, and then goes on to consider the co-evolutionary mode by which sustainability is enacted. Both the condition and mode refer to the co-evolutionary enactment of sustainability and are displayed in Table 4.10.

Level	Label	Definition
Enactment condition	**Co-evolutionary scope**	Co-evolutionary scope is a condition in which agents have a clear mandate within which to self-organise.
Mode of enactment	**Co-evolutionary self-organisation**	Co-evolutionary self-organisation is the process whereby an agent actively contributes towards co-evolutionary outcomes.

Table 4.10: Co-evolutionary enactment

Co-evolutionary scope is a condition of emergence in which agents have a clear mandate within which to self-organise. A clear mandate is characterised by articulated boundaries within which the agent is empowered to make decisions and self-organise. This condition brings together the embedded and embodied dimensions of the domain where agents have embodied sustainable practice sufficiently to be able to perceive and respond in a co-evolutionary manner to a rapidly changing environment. This goes beyond traditional performance management which is orientated towards clearly defined performance goals; there is a more fuzzy goal orientation which allows for greater flexibility and more innovative responses.

This condition requires role clarity and a clear sense of how the role of each agent is connected to sustainability, or relevant sustainability goals. Whilst goal setting is useful as a "regulatory mechanism for monitoring, evaluating and adjusting one's behaviour" (Locke & Latham, 2009, p. 19), goals also focus attention and consequently reduce an agent's awareness of other contextual factors that may be important considerations (Grant, 2012). An overemphasis on performance goals and performance management can result in a situation where the "narrow

focus of specific goals can inspire performance but prevent learning" (Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009, p. 11).

Addressing complex problems in dynamic, fast changing environments requires that a focus on narrow performance goals be broadened to more fuzzy goals which allow for the flexibility and revisability required for more innovative responses (Bright & Pryor, 2013). The condition of co-evolutionary scope emphasises a bounded flexibility as a condition for self-organisation. Interviewees emphasised the importance of incorporating sustainability into role definitions as a requisite for achieving this condition. As a middle manager in Namibia described it:

> "I think going forward - I think it's going to be a lot better than it is now as they sort of define their own roles in terms of sustainability within their departments. I think they will find their feet and will become easier. Initially it's been a bit difficult and I haven't seen a lot of value from it, but I think it's slowly starting to change. What's good is that everybody that is on board are very passionate" (AN14).

Some interviewees suggested that financial constraints inhibited co-evolutionary scope. As a middle manager based in Namibia commented:

> "It's still difficult because it's a new concept for the whole Group to understand and, also, the budget - you need to have finance to do this - it's very easy to come up with innovative ideas but it's still a financial decision at the end of the day. So, yes, I think that's one of the major struggle points – it's finances and also dedicated personnel to help with that. We don't have a department focusing specifically on sustainability within the Group so that's also just added to some of the portfolios of current employees and I think that's also a struggle point - is time. We don't have a lot of time to focus on this" (AN17).

Interviewees from the Botswanan entity were satisfied that they had made a good start in focusing on behaviours that would support sustainability; they admitted there was still a long way to go since the process had just started. There was optimism that the new green building, which was being constructed as the new head office, would provide a supportive context for sustainability practices. Respondents anticipated that the green building would encourage sustainability-related behaviours. However, co-evolutionary scope was seen to require the

forging of links with current business practices, rather than operating as a separate initiative. According to an executive in Botswana:

> "First thing - awareness, for me. Like I'm saying - that people can understand the discipline. Second thing is the link between everything else and sustainability - how does everything that we do speak to sustainability, such that people are aware that what they do is either adding or subtracting from where we want to go. For me those are the two key things" (AB5).

Thus co-evolutionary scope can be seen as space in which agents are able to enact sustainability. It is not separate from current business practices, but rather an integral part of current and emergent business practices.

Co-evolutionary self-organisation was identified as the mode through which the co-evolutionary domain of sustainability was enacted. Co-evolutionary self-organisation is the process whereby an agent actively contributes towards co-evolutionary outcomes. Self-organisation should not be equated with unconstrained agent behaviour since it is both constrained and enabled through local interaction, as well as having inbuilt constraints from broader evolutionary processes (Stacey, 2010). Self-organisation refers to behaviour at a local level where agents are able to take and implement decisions within their co-evolutionary scope. In this way self-organisation is a process whereby sustainability emerges rather than being driven through the formal chain of command:

> "Self-organising agents behave in exploratory and experimental ways and do not have complete knowledge of the circumstance surrounding their actions. This is contrasted with deliberate control exercised through formal and informal power, through authority and feedback processes of bureaucracy, and through work routines which discipline human interaction" (Stacey, 2010, p. 79).

Whilst sustainability was not being driven through formal hierarchy, there was a recognition amongst interviewees that more visible executive leadership and positioning within the organisation would support co-evolutionary self-organisation. A senior manager in Namibia commented:

> "I think the reality is (the MD and executive team), first of all, need to really have an understanding strategically of how sustainability will work and where it's going to find a

> home, because you can't drive this into the organisation, I believe, if you don't have people who are able to be ambassadors for it - help people understand it - bring people on board" (AN5).

The need for co-evolutionary self-organisation was emphasised, yet it was acknowledged that this is currently lacking in the Group. Note that for this interviewee, whilst co-evolutionary self-organisation was positioned as important across the business, accountability was still emphasised ("where it's going to find a home"). Many interviewees commented that people were reluctant to enact sustainability due to unfamiliarity and not knowing how to respond (AN5, AN14), as well as the lack of sustainability expertise in the business (AN15). Some interviewees suggested that focusing on the sustainability of the business when coupled with the behaviours and sustainability targets was an effective way of moving towards co-evolutionary self-organisation (AN16). The most commonly held view was that co-evolutionary self-organisation was present in pockets across the organisation. According to a middle manager working across all entities:

> "In our everyday thinking and actions and all of those things haven't been embedded to the point where people think sustainable practice on a daily basis or at least once a week" (AN6).

The quantitative data showed several clusters (clusters 1 & 5), with a combined cluster weight of 76.22%, adopting a very positive view of all axes, including sustainability. The clusters had high representation from the branch network and either a junior or middle management level. In contrast, the most critical cluster (cluster 4), with an 8.88% cluster weight, had strong representation from senior management and head office staff. Interviewees were interested in this pattern in the data and one senior manager based in Namibia commented that "if the majority of our junior management and staff below that level are thinking that we're okay (with regard to corporate sustainability), that's pretty scary for me because there's no drive then to really push the boundary of sustainability because they think we're fine. That's worrisome, actually" (AN5). This view suggests that self-organisation around corporate sustainability is still nascent, and increasingly so outside the head office environment.

The branch network is typically characterised by work that is highly procedural. Some interviewees commented that at times it seems that procedural orientation makes agents disinclined to analyse the requirements of the specific situation instead of indiscriminately

applying procedures. As the bank faces fast changing market conditions and increasing disruption, the need for a sales orientation has grown. This can be seen as an example of co-evolutionary practices of which sustainability is also a part. An area manager in Namibia illustrated a self-organised approach in this area:

> "As I said, we have to change our whole mindset as a bank to become more self-orientated which we are doing. So it's changing people's mindset from just sitting back. I had a staff meeting with the branch on Friday morning and I asked them: who's the sales team? Will the sales team stand up? The three people in the sales department stood up. I said: did you hear my question? Who is the sales team? So there's that mindset and perception that – the sales department has to do the sales. I said to them: no, each and every one of you in this branch is part of the sales team. Sales is everybody" (AN3).

Interviewees in the subsidiary businesses had varying observations. There was the example of the Zambia business investing in solar energy due to substantial and protracted disruption to the energy supply. There were also views that in Botswana there was a tendency to wait for Group to initiate. A senior manager based in Botswana saw red tape as a substantial inhibitor of co-evolutionary self-organisation:

> "If we would like to do something then you start getting towards the red tape: all the procedures, committees and the hoops to have to jump through - it feels like it's designed in such a way that it keeps things being ideas, rather than practical solutions. Also, the ability to deal with change is frightening - it takes so long to get anything done that you can't respond to change. I think in terms of sustainability that action needs to be relatively swift - no use trying to go forward if you can't even deal with what you currently have" (AB10).

Co-evolutionary self-organisation can thus be nascent across the Group. Uncertainty pertaining to how to respond to corporate sustainability was perceived as an inhibitor, alongside budgetary constraints and excessive red tape.

4.4.6 Epistemological performance domain

This section reports on the qualitative results for the exterior-collective integral quadrant (Wilber, 2001), which is the systemic performance domain of Cassandra. This domain has been repositioned as the epistemological performance domain and is focused on knowledge supporting co-evolution with the containing system.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. Epistemological range was identified as a dimension at the embedded level, and epistemological network density as a dimension operating at the embodied level. Both dimensions are displayed in Table 4.11.

Level	Label	Definition
Embedded dimension	**Epistemological range**	The extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded.
Embodied dimension	**Epistemological network density**	The extent to which the epistemological network has rich interconnections.

Table 4.11: Epistemological dimensions

The dimension of **epistemological range** describes the extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded. Since the challenges of sustainability relate largely to complex phenomena which are ontologically plural, multiple methodologies are needed to enact sustainability (Esbjörn-Hargens, 2010). This in turn requires epistemological pluralism and hence a wide epistemological range.

Situated in the exterior-collective domain (Wilber, 2001), this dimension considers the extent to which the range of knowledge is sufficient to enable effective co-evolution with the containing system. A middle manager based in Namibia described the importance of a wide epistemological range:

> "It's more about creating sustainability from a business perspective, but it also links in with some of the behaviours looking at the bigger picture. I think part of the Group's sustainability targets and that will also flow through in the context of get the whole picture - look at things in more detail, get all the information before you take a decision, look at all the risks so that element of what the Group strategy is also forms part of the awareness and the training" (AN16).

The Group went through an exercise of identification of material issues to be incorporated into risk reporting. This work was extended into the Botswana subsidiary. An executive in Botswana commented:

> "We had a session with someone from Namibia where we actually identified the material issues that we actually wanted to track to such an extent that it was also incorporated into our risk reporting. So on a monthly basis we are tracking but I don't know if, at entity level, we fully understand the principle as such that it's becoming part of what we do" (AB5).

Expanding epistemological range requires data to be generated that connect business activities and impact on the containing system. A middle manager in Namibia spoke of the struggle in dealing with push-back in the business when financial impact was not immediately evident:

> "There's a lot of push-back because people see it that they'll have to invest more time, they don't have time and they want to see the monetary impact. So whatever project you want to do now, we need to be able to show them what the monetary impact will be. For instance, we're looking at using meters that will check the electricity and also at 6pm at night all the lights will switch off, but now they want to see what the monetary impact will be. So it takes quite some convincing with some people to actually buy into the whole sustainability initiative" (AN12).

Many interviewees spoke of disruption in the financial services sector and potential threats to the current business and revenue models. This context driven by rapid innovation in information technology has expanded the epistemological range necessary to navigate the ways in which the sector is evolving. Corporate sustainability is unfolding in this dynamic

context in which co-evolution with the containing system is challenging the business on multiple fronts. According to an executive based in Namibia:

> "Maybe one thing I can say to you is what I see - we can easily be caught off-guard on innovation and sustainability - talking about disruptions and the change in the financial environment. It is drastically changing, new fintech and competitors - not the normal competitors, but from totally outside and that we think okay focusing only on financial sustainability but that we think we are safe and on the right path, while I think then we should actually be more concerned on it and that the sustainability showing here (in the quantitative dataset) may be a bit misleading, specifically on financial. We should be more worried about sustainability" (AN11).

The widening epistemological range needed for co-evolution makes it increasingly difficult for agents to gain perspective on the big picture and separate out the data from the noise. As the epistemological range increases, so does the need to filter information and to expand the capacity to analyse and synthesise it.

The dimension of **epistemological network density** describes the extent to which knowledge is networked with rich interconnection between elements. The ontological pluralism associated with sustainability requires methodological pluralism for sustainability to be enacted (Esbjörn-Hargens, 2010). This results in epistemological pluralism as agents access multiple sources of knowledge drawn from divergent disciplines. Sufficient synthesis and interconnection between epistemological elements are advantageous for enacting corporate sustainability.

Epistemological networks are typically digitally embodied in knowledge management systems and increasingly virtually embodied through learning algorithms and artificial intelligence. Harari (2018) argues for the advantages of connectivity and updatability of the future use of artificial intelligence in organisations, which may be substantial enough to risk the continued use of a human workforce. The key here is to "compare the abilities of a collection of human individuals to the abilities of an integrated network" (Harari, 2018, p. 22). To compare favourably, agents must learn to work symbiotically with the epistemological network towards co-evolutionary self-organisation.

An executive based in Namibia discussed an idea that he and colleagues had been working on involving the development of a learning system which enabled a feedback loop to support co-evolutionary self-organisation:

> "The idea of the learning system is sort of built in and it is within our overall sustainability policy - a type of feedback loop is also entrenched in that. However, we haven't actually run major projects on this that we've actually rolled out group-wide on a continuous basis… so having small challenges that you issue to staff and you constantly report on it as live as you can and then sort of entrench the behaviour while the challenge is still fresh in their minds. So later it becomes second nature and you can move on to a new challenge" (AN13).

A middle manager in Namibia commented on how knowledge develops through interaction with a diverse range of stakeholders, thereby increasing the density of the epistemological network:

> "I think people are not trained enough and encouraged enough to get involved in various idea sharing and innovation…We're not empowering staff members enough. If these issues are not addressed there aren't sufficient opportunities for me to interact with colleagues, so that is where I think we're lacking because it's that bringing people in touch with each other, sharing the ideas, even sharing the ideas with your manager and top management, that's not taking place and that's where we're lacking" (AN12).

For the business to be able to respond to climate change, data are required to measure performance in areas such as carbon footprint. A middle manager in Namibia discussed difficulties associated with tracking data to meet the target of reducing the Group's carbon footprint by 5% by 2020. The challenge derives from the data being scattered around the business and not readily available for monitoring. She went on to say:

> "So the first thing that comes to mind is that it's slow. I'm also not always sure that everything - all the information is compiled will give you a bigger picture. That's something that I've been experiencing. Sometimes all the information is lying in silos somewhere and everything isn't combined" (AN12).

One of the issues identified in Botswana was a perceived tendency to wait for Group rather than to actively innovate. This poses a risk for the density of the epistemological network in

that it is likely to result in inadequate links to local knowledge sources. As an executive in Botswana commented:

> "And the innovation was much higher (in the Zambian entity) because of the initiative and the ownership whereas here they're saying: Oh well, we belong to the Group and Group must tell us how they want to do it, when they want to do it and we'll sit back and wait and that's the mental model I need to break at this stage" (AB7).

Whilst there were some ideas conducive to enhancing the density of the epistemological network, this area is inhibited by inadequate data systems and lack of interaction across diverse stakeholder groups.

Condition and mode of emergence

This section discusses the epistemological condition that enables the emergence of sustainability, and then goes on to consider the epistemological mode by which sustainability is enacted. Both the condition and mode in this section refer to the epistemological enactment of sustainability and are displayed in Table 4.12.

Level	Label	Definition
Enactment condition	**Epistemological contact**	The extent to which relevant data needed for co-evolution is accessible to agents.
Mode of enactment	**Epistemological extension**	The process whereby knowledge of co-evolution is extended through the enaction of sustainability.

Table 4.12: Epistemological enactment

Epistemological contact is a condition of emergence where relevant data needed for co-evolution is accessible to agents. Creating epistemological contact is challenging in sustainability as phenomena are complex and difficult to perceive with a large epistemological distance. Epistemological distance represents the extent to which a phenomenon can be perceived.

Epistemological distance has been described as a key challenge facing sustainability (Esbjörn-Hargens, 2010). Phenomena such as climate change and other planetary or broad social-

economic system data are distant in that they can only be indirectly grasped through the use of multiple indicators (Carolan, 2004). An implication of this distance is that corporate sustainability has to be enacted through multiple methodologies which require a wide epistemological range to be synthesised or networked to be accessible and comprehensible to agents. In this way, epistemological contact connects the agent with knowledge needed for co-evolutionary self-organisation.

A middle manager in Namibia commented on employees not seeing connections between behaviour and environmental impacts. This is an example of epistemological distance where the impact of behaviour is not apparent to employees:

> "I'm concerned that people aren't clued up enough with what they're supposed to do and how they can impact and how they actually do impact sustainability. I don't think people realise, for instance, if you don't switch off the lights tonight it's not just got a financial impact but also an environmental impact because now we need to put on extra power into operation again because - well, you need to burn more coal and all that. You need to educate people on the impact that they have and how they can improve that and I'm not sure that that's actually coming through in what we're doing" (AN12).

Communication between management levels and across the group was seen to adversely affect epistemological contact. An executive in the Botswanan entity commented on the lack of communication flow from executive to the rest of the Group resulting in over-optimistic ratings in the quantitative dataset:

> "But the only comment I make on cluster 5 is it's too optimistic. It says something about - this is typically executive that think the rest of the people know exactly what is going on but, in the meantime, it's only them who knows what's going on because they sit at the board room tables and the rest of the people are on the outside - they're not communicating properly" (AB7).

The lack of epistemological contact was evident in the Botswana business, where an executive in the Botswanan entity said:

> "I must say that I haven't felt the impact of a sustainability program on the Group yet. Maybe I'm sitting too far removed from the real project, so I'm not close to that project

at all. There might be some good stuff happening behind the scenes, but my gut feel says to me: That's just (Namibian entity) focus. They struggle to lift their head and look at the other entities and develop a group-wide solution, rather than just an entity solution" (AB6).

Epistemological contact shows up in multiple ways and relates to the lack of accessible and understandable data with which to monitor business practices but can also relate to lack of exposure to information at different levels in the organisation or between holding company and subsidiary.

Epistemological extension was identified as the mode through which the epistemological domain of sustainability was enacted. Epistemological extension is the extent to which knowledge of co-evolution is extended through the enaction of sustainability. Epistemological extension as a mode of enaction is closely linked to self-organisation. As the agent enacts sustainability, the interaction between the outcome of the action and the intention provides an opportunity for epistemological extension:

> "As soon as an individual takes an action, whatever that action may be, it begins to escape from his intentions. The action enters into the universe of interactions and in the end, it is the environment that seizes it in the sense that it can become the opposite of the initial intention" (Morin, 2008, p. 55).

The dynamics of, and interactivity between, complex systems means that the extension of epistemological systems is a continuous activity. Whilst epistemological extension can relate to a widening range of knowledge or the forming of new connections or understanding of existing knowledge, it can also relate to a lengthened temporal horizon of investigation. A senior manager in Botswana commented on the need for longer-term thinking. A widening temporal horizon for epistemological extension holds the potential to facilitate longer-term thinking:

> "But the over-riding concerns are the here and now so if that long-term thinking isn't there then sustainability is continuing to draw the short straw. And the need to ensure that long-term thinking isn't necessarily attached to current financial position. It's going back to what I said previously, that the need for profit now shouldn't impact to such an extent on long-term thinking on sustainability" (AB10).

The opportunity for epistemological extension through the local activities of self-organising agents was recognised in the Group. An executive in Namibia spoke about a platform which was being designed to support the generation and implementation of ideas in the business:

> "Creating an environment where people are aware that their ideas count, they have a platform where they can voice that idea, and where that idea is actually being assessed where everyone else can see it. If it's got merit it percolates to the top, and something gets done with the top ideas and that the person who initially came up with the idea gets acknowledged and rewarded in one way or another" (AN9).

Epistemological extension is facilitated through action. The agent encounters complexity in acting and this provides the opportunity for epistemological extension and learning. In this way co-evolutionary self-organisation is learning. There is evidence of epistemological extension taking place through interaction with customers and stakeholders. A middle manager in Namibia remarked:

> "There's a lot of things that is impacting people's decision making, so we're moving now and we're also trying to get people involved not only from the bank's perspective, but also focusing on clients that you can assist. We're also looking at agricultural projects to help farmers to farm more sustainably and to assist them. So we're actually - now that the penny's dropped for us - we're looking at ways to expand to other people and that's where the 'connectors of positive change' comes in because now it's not only us going somewhere, but we're taking people with. Stakeholders and clients as well" (AN12).

Whilst employees in the branch networks across the Group are very involved in corporate social responsibility initiatives, many interviewees were concerned that there was a low level of awareness and involvement of staff with sustainability initiatives. An executive in Botswana was concerned that many employees were not yet "on the journey":

> "I think the key thing for me is that there's just a few people who understand it and who are actually on the journey (to sustainability) but the other portion of the organisation is not really on board" (AB5).

This helps to explain the very high ratings of several clusters in the quantitative dataset. If there is not a clear recognition of issues around sustainability, it is unlikely that agents will self-

organise around sustainability. Whilst recognition of the progress towards sustainability is justified given the substantial steps that have been taken in the Group, it must be remembered that these initiatives are still new, and much of the monitoring and implementation are not yet in place. High satisfaction scores on the sustainability axis (4.84; 5.09) for the two largest clusters (with a combined weighting of 76.22%) suggest that there may be low levels of epistemological contact and hence inadequate epistemological extension. That being said, tangible steps are being taken to address these areas.

4.4.7 Conclusion

This section presented the findings of the qualitative data for Case A. The emergence of sustainability was seen to be enacted through four modes. Four conditions were found to underpin the enaction of corporate sustainability. Coherence was found to operate at both embedded and embodied levels, and four dimensions were identified at each level. Modes, conditions and dimensions included all integral quadrants. Case A showed well-developed axiological signification across the group. In particular, axiological coalitions in the Namibian entity have played a key role in developing sustainability in the business. This, however, has not yet progressed to a full implementation and it showed up in nascent co-evolutionary scope and practice. The next section will synthesise the quantitative and qualitative data for this case.

4.5 Synthesis of case findings

This section uses the qualitative data to interpret the quantitative findings for Case A and seeks to synthesise the datasets to identify key assertions for each research question. In an explanatory sequential mixed method design, the emphasis is on using the qualitative data to explain the quantitative results by drawing inferences. The first research question focuses on the clusters, and the second focuses on the levels of coherence. The third research question considers both aspects.

4.5.1 Emergence of corporate sustainability

This section addresses the first research question with respect to Case A, namely, *how does sustainability emerge in financial institutions?* Corporate sustainability emerged through the

interaction of five clusters. A summary of the cluster function and weights is presented in Table 4.13. The level of influence of each cluster is indicated, which was determined using the qualitative data. The clusters are marked in green if they are developed or well-developed, in amber if they are either over-developed or under-developed, and in red if they are nascent.

Cluster	Function in system	Rating pattern	Cluster weights	Level of influence
Praise singers	Supports unity of the whole	Very optimistic, very low levels of differentiation	36.68%	Over-developed
Guardians	Supports and maintains the status quo	Optimistic, low levels of differentiation	39.54%	Well-developed
Pivots	Brings together diverse interest groups	Variable levels of optimism, high levels of differentiation	0.86%	Nascent
Devil's advocate	Enhances the mainstream through criticality	Moderately critical view, with subtle differentiation	14.04%	Developed
The resistance	Influences by highlighting current and future concerns	Critical and differentiated	8.88%	Under-developed

Table 4.13: Case A cluster summary

Five clusters were identified in the data, and the clusters were reflected on in the interviews. Case A displayed a prominence of optimistic clusters, with the praise singers and guardian clusters having a combined weighting of 76.22%. Whilst both these clusters have a positive role in a complex adaptive system, many interviewees cautioned against overly optimistic

agents inhibiting the co-evolutionary process, as some agents either do not adequately perceive the extent of the transition to sustainability or don't feel sufficiently safe to challenge the status quo. Whilst there was ample evidence of sustainability initiatives in the business, there seems to be a mismatch between the level of ratings and the magnitude of these initiatives, showing that the vast majority of employees are not yet perceiving the extent of the transition to a more sustainable future.

However, what was very positive was that the most critical cluster, the resistance, viewed sustainability as an area of relative strength, rating it higher than the other axes. This was somewhat similar to the devil's advocate cluster, who rated sustainability and finance jointly as the second strongest area. These results imply that the key support of the transition to a more sustainable co-evolutionary process is in the hands of 22.92% of the population. Whilst this might not be sufficient, it should be considered in the context of the move to sustainability starting with just two agents. Seen in this way, there is substantial progress over a five-year period. Interestingly, the more critical view was supported more strongly by agents in the subsidiaries, suggesting the value of learning from localised co-evolutionary processes.

The pivots cluster is capable of bringing together diverse interest groups due to the high variation in levels of optimism and the substantial differentiation between ratings of axes. This cluster remains an outlier with only 0.86% weighting. The low innovation axis score was of interest to most interviewees, many of whom agreed that it was a key area of concern in the business. In the perception of interviewees disruption and generally dynamic market conditions, together with the vast changes required by sustainable co-evolutionary functioning, increased the need for innovation in the business.

To understand how corporate sustainability emerges, it is important to consider how agents enact corporate sustainability. Four modes of enactment were identified in the interview data. The modes describe the means by which agents, from any cluster, enact corporate sustainability. Table 4.14 displays the modes and definitions. Where the mode was recognised by interviewees and examples of enaction of the mode were supplied, the mode is marked in green. Where the mode was recognised and there was limited evidence of enactment the mode it is marked in amber, and where the mode was recognised but not yet enacted it is marked in red.

Modes	Definition	Case A (holding company)	Case A (subsid-iaries)
Axiological coalition	A coalition of agents who enact sustainability via the activation of a shared axiological frame.	Recognised and enacted	Recognised and nascent enaction
Semiotic refraction	The process of perceiving a differentiated view of a multiple object using a sign.	Recognised and nascent enaction	Enacted in Zambia but not Botswana
Co-evolutionary self-organisation	The process whereby an agent actively contributes towards co-evolutionary outcomes.	Recognised and nascent enaction	Enacted in Zambia but not Botswana
Epistemological extension	The process whereby knowledge of co-evolution is extended through the enaction of sustainability.	Recognised and nascent enaction	Recognised and nascent enaction

Table 4.14: Case A enacted modes summary

The enactment of the modes of corporate sustainability is mostly nascent in Case A. Axiological coalitions, however, have supported the substantial progress achieved thus far. Whilst there is a lot of evidence of corporate sustainability-related initiatives, these have not yet been enacted by the majority of agents – unlike corporate responsibility. This helps to explain the very high weighting of the optimistic clusters and may suggest limited awareness of the nature and extent of the transition to a more sustainable future.

There was evidence of co-evolutionary self-organisation in the Zambian subsidiary in dealing with local power constraints, yet the overall orientation towards corporate sustainability seemed to be quite centralised, presenting an opportunity to encourage and learn from local

co-evolutionary processes. The higher representation of the subsidiaries in the more critical clusters supports the potential usefulness of a de-centralised approach to corporate sustainability.

4.5.2 Role of coherence in corporate sustainability

This section answers the second research question with respect to Case A, namely, *what is the role of coherence in the emergence of sustainability*? Coherence can be seen as the co-evolution of the integral quadrants (Edwards, 2010). Figure 4.15 shows the levels of coherence within each axis. Where an axis is coherent across all clusters or has multiple points of coherence it is marked in green. Where there are moderate levels of coherence it is marked in amber, and where it is decoherent it is marked in red.

Cassandra Axis	Integral quadrant	Case A
Diversity	Lower left	Moderate coherence across all clusters
Complexity		Moderate coherence across all clusters
Personal wellbeing	Upper left	Moderate coherence across all clusters
Leadership and teamwork		Moderate coherence across all clusters
Financial performance	Upper right	Coherent across all clusters
Innovation potential		Decoherent
Sustainable development and social responsibility	Lower right	Coherent, with two points of coherence
Knowledge and learning		Two moderate points of coherence

Table 4.15: Zones of coherence in Case A

Two zones of coherence were identified in Case A. The most coherent was the sustainability axis in which responses gravitated towards two points of coherence, followed by finance. This confirmed Putnik's (2009) observation that organisations tend to emphasise exterior integral quadrants. The decoherence in the innovation axis was of concern to many interviewees due to market conditions, alongside the transition to a more sustainable future.

Understanding the role of coherence in the emergence of sustainability was extended through the interview data where four dimensions of coherence were identified at both the embedded and embodied levels of corporate sustainability. Figure 4.16 displays a summary of the embedded dimensions and Figure 4.17 displays a summary of the embodied dimensions for this case. Dimensions which are recognised and embedded or embodied are indicated in green, whilst dimensions that are recognised but only partially embedded or embodied are marked in amber. Where dimensions are recognised but not embedded or embodied, they are marked in red.

Embedded dimensions	**Definition**	**Case A (holding company)**	**Case A (subsid-iaries)**
Axiological signification	The extent to which co-evolutionary axiological direction is compelling to stakeholders.	Recognised and embedded	Recognised and embedded
Semiotic symbiosis	The extent to which what is considered personally meaningful is enriched by symbiotic interaction with the containing system.	Recognised and embedment is nascent	Recognised and embedment is nascent
Co-evolutionary value	The extent to which value is simultaneously created for the organisation, stakeholders and containing system.	Recognised and partially embedded	Recognised and embedment is nascent

Epistemological range	The extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded.	Recognised and embedment is nascent	Recognised and embedment is nascent

Table 4.16: Case A embedded dimensions summary

The high level of coherence in the sustainability axis can be partially explained by the strong axiological signification across the group. The remaining dimensions are recognised but nascent or partially embedded. This may be due to many of the sustainability initiatives being fairly new.

The embodied dimensions, presented in Table 4.17, are less developed than the embedded dimensions. Whilst axiological signification is well embedded, axiological resonance remains to some extent aspirational. Co-evolutionary practices are still rare, as sustainability initiatives are being set up but not fully implemented. There is thus work to be done for corporate sustainability to be embodied at the level of agent.

Embodied dimensions	Definition	Case A (holding company)	Case A (subsid-iaries)
Axiological resonance	The extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent.	Recognised and partially embodied	Recognised and embodiment is nascent
Semiotic embodiment	The extent to which sustainability is personally meaningful and implicit.	Recognised and embodiment is nascent	Recognised and embodiment is nascent
Co-evolutionary practice	The extent to which co-evolutionary activities are embedded in the agent's regular business practices.	Recognised but lack of embodiment	Recognised but lack of embodiment

Epistemological network density	The extent to which the epistemological network has rich interconnections.	Recognised and embodiment is nascent	Recognised and embodiment is nascent

Table 4.17: Case A embodied dimensions summary

The embodied dimensions are crucial to self-organisation of agents in the system. As corporate sustainability is enacted, the embodied dimensions will be strengthened through application.

4.5.3 Conditions of corporate sustainability

This section addresses the third research question with respect to Case A, namely, *what conditions enable the emergence of sustainability*? The conditions of enacted sustainability are displayed in Figure 4.18. Conditions which are recognised and present are indicated in green, whilst conditions that are recognised but only partially present are marked in amber. Where conditions are recognised but not present, they are marked in red.

Conditions	Definition	Case A (holding company)	Case A (subsid-iaries)
Axiological frame	An axiological frame is a shared perceptual lens which constitutes what is perceived as valuable.	Recognised and nascent	Recognised and nascent
Semiotic intention	Semiotic intention is the extent to which active engagement in sustainability is driven by a sense of personal meaningfulness.	Recognised and nascent	Recognised and nascent
Co-evolutionary scope	Co-evolutionary scope is a condition in which agents have a clear mandate within which to self-organise.	Recognised but not yet present	Recognised but not yet present

Epistemological contact	The extent to which relevant data needed for co-evolution is accessible to agents.	Recognised and nascent	Recognised and nascent

Table 4.18: Case A enacted conditions summary

The conditions are mostly nascent, except for the co-evolutionary scope: interviewees commented that agents for the most part are not yet clear on how they can contribute to sustainability. The conditions relate to both the cluster profiles and the levels of coherence in the quantitative data. Moderate levels of coherence in the axes across the upper and lower left integral quadrants can be partially explained by most of the conditions being nascent. Ultimately for corporate sustainability to be enacted, agents require a clear co-evolutionary scope which forms the basis of sustainability-related efforts. The nascent conditions can also be seen to partially explain the over-developed praise singers cluster, where agents do not have sufficient epistemological contact to perceive the extent of the sustainability transition.

4.5.4 Conclusion

This chapter presented the quantitative and qualitative findings for Case A. Great strides have been taken towards sustainability which has emerged alongside the finance axis, as can be seen in the high levels of coherence in the sustainability and finance axes. The coherence in the sustainability cluster can be partially explained by effective axiological signification.

The majority of agents in the system, however, do not yet perceive the magnitude of the sustainability transition required - 76.22% of respondents display an overly optimistic rating profile. This is to some extent explained by the lack of epistemological contact and co-evolutionary scope. The need for increased innovation capacity can be seen as a key area of concern, which is exacerbated by both market conditions and the transition to a more sustainable future.

The clusters provided a view of the emergence of sustainability which was extended through the identification of four modes through which sustainability was enacted. Conditions that supported the enactment of sustainability were described. Dimensions of coherence that supported the enactment of sustainability were identified on two levels, namely embedded and embodied. The next chapter will present the findings for Case B.

CHAPTER 5: CASE B FINDINGS

5.1 Introduction

This chapter presents the findings of the second of two cases, referred to as Case B. Background to the case is provided and the results of the Cassandra survey and interviews are discussed in relation to how sustainability emerges in the financial institution. This case forms part of a large South African financial services group with a presence across Southern Africa. The sample only included the Namibian operation.

5.2 Company context

Case B is a subsidiary of a large South African financial services group with subsidiaries in six countries in the Southern African Development Community. The group had total assets to the value of R965 billion in 2017 and has an international reputation for market-leading sustainability practice. The Namibia based group has subsidiaries in financial services in commercial and personal banking, corporate and specialised finance, personal lending, wealth management, life assurance, property and asset finance, foreign exchange and securities trading. The Namibian group had total assets to the value of N$6.04 billion in 2016 and is listed on the Namibian Stock Exchange. The group was ranked amongst the top five companies in the Deloitte Best Company To Work For survey in 2016.

5.2.1 Progress towards sustainability

The level of progress towards sustainability will now be considered. This section comprises deskwork and the scrutiny of available company documents using the Edwards (2009) stages of organisational sustainability model. An analysis of the level of progress towards sustainability was used to determine the relevance of the case for studying fourth wave sustainability, which was discussed in chapter 2. This model was selected as it offers a comprehensive stage model based on the synthesis of multiple stage models.

The documents reviewed included the 2017 integrated report for the Namibian group, the 2016 sustainability report and 2017 sustainable development review for the South African business, a case study featuring the South African business, the company websites and online media articles. The purpose was to determine the stage of organisational sustainability maturity using the Edwards (2010) stages of organisational sustainability model, as displayed in Table 5.1.

Edwards (2010)		**Ernest & Young (2015)**
Stages of sustainability	**Stages of organisational sustainability**	**Business Sustainability Maturity Index**
Preconventional	Subsistent organisation	
	Avoidant organisation	Risk
Conventional	Compliant organisation	Compliance
	Efficient organisation	Opportunity
Postconventional	Committed organisation	Integrating
	Sustaining organisation (local)	Leading
Post-postconventional	Sustaining organisation (global)	

Table 5.1: Stages of organisational sustainability

The South African group has an impressive track record in corporate sustainability with a strategy and mechanism for "identifying and investing in financial opportunities that have the potential to impact social, environmental and economic development positively and serves to expedite the transformation required. It also informs our operational and corporate social investment activities" (Sustainability report, 2016:3)[13]. Decision making associated with this shift in lending is supported by eight long-term goals, which were developed through consideration of the Millennium Development Goals, the United Nations Environment Programme Green Economy Initiative, the United Nations Framework Convention on Climate Change and the South African National Planning Commission Diagnostic Report (Mosher & Smith, 2015).

These initiatives in the South African group are geared towards the integration of sustainability into the business and have tangible goals and mechanisms for implementation, which would suggest that the South African business is at a postconventional stage of maturity. This was confirmed by the Ernest & Young (2015) benchmarking of the group.

The Namibian group positions the business as having a responsible approach to the future and aligns itself explicitly with the World Business Council for Sustainable Development. The group describes itself as a responsible corporate citizen, with a focus on sharing expertise and mutually beneficial partnerships as opposed to "cheque book philanthropy".

The Namibian group would seem to be at a conventional stage of organisational sustainability. Whilst the positioning of the group emphasises sustainability, much of the current focus has been on corporate social responsibility (CSR). There is a mature approach to CSR in which long-term partnerships are formed that add mutual value to multiple stakeholder groups. Of interest are programmes that emphasise employee volunteerism on social and environmental initiatives which link to embedding a responsible ethos and support the organisational climate and culture; these have resulted in the Group achieving fourth place in the Deloitte Best Company To Work For survey in 2016.

[13] To protect the anonymity of the organisations, the integrated reports and sustainability maturity assessment are not included in the reference list.

5.3 Quantitative findings

The group was assessed holistically using the Cassandra survey, and analysed using self-organising maps to give a graphic representation of the emergence of corporate sustainability. The quantitative data for Case B will be presented in this section. Each cluster identified in the data will be analysed.

5.3.1 Sampling profile

To obtain a robust view of the emergence of sustainability in the company, the entire population of employees was selected from supervisory management up to executive levels. As with the first case, the junior specialists and clerical levels and below were excluded due to the complexity of the Cassandra survey and anticipated difficulty in completing the survey due to lack of access to information and the complexity of questions.

5.3.2 Implementation of survey

The Cassandra survey was implemented on the SurveyMonkey platform and distributed online with a letter of invitation from the executive sponsor of the research, which contextualised the study from an organisational perspective and encouraged participation. A letter of consent was obtained from the organisation. Respondents participated voluntarily, providing consent as part of the survey. Whilst the link to the survey was whitelisted by the IT department and technical specifications checked, some technical issues were experienced in the branch network. Issues were dealt with promptly to encourage response.

5.3.3 Response rate

The response rate for the Cassandra survey is presented in Table 5.2:

Total population	Number of responses	Percentage Response
311	178	57.23%

Table 5.2: Response rate

The overall response rate of 57.23% was very strong given the length of the instrument. The response rate was supported by executive sponsorship, and the linking of the research to a strategic initiative of the bank, which positioned sustainability centrally within the strategic thrust of the business.

5.3.4 Data cleaning

The dataset was cleaned, as with Case A, by removing responses in which the survey had not been completed or where there was no variation in responses across the entire instrument and the reversed items had not been identified, suggesting that the respondent might not have responded thoughtfully to the survey. It resulted in minimal changes to the dataset.

5.3.5 Missing data

As with the previous case, an “I don’t know” response option was provided due to the complexity and breadth of the survey. To be included, respondents had to have completed all items on axes for a minimum of 50% of the axes. Composite scores were derived and the Supersom function on the Kohonen package on R was implemented. In these cases, distances were normalised using:

$$\frac{n}{n-nNA}$$

Axes that had missing data were excluded from the analysis. This approach to handling missing data was selected to preserve the size of the dataset. The percentage of responses included is presented in Table 5.3. Note that the table indicates the number of respondents included but doesn’t indicate axes that were incomplete and therefore excluded from the respondents’ data.

Number of responses	Number of responses included	Percentage included
178	159	89.32%

Table 5.3: Missing data

5.3.6 Implementing the self-organising map in R

The self-organising map (SOM) analysis was implemented in R, using the Kohonen package. Packages sit within R and extend the functionalities of the programme. The SOM was used to conduct an exploratory segmentation of the data. A sequential learning algorithm, the default option in the Kohonen package, was used. This is an online stochastic learning algorithm.

Training process

The training process was set at 10 000 epochs. A plot of the training process, the change plot, is presented in Figure 5.1. This plot displays the mean distance to the closest codebook vector during the training. As the training process progresses through the iterations, the weights of the nodes become increasingly similar to the samples represented by that node (Wehrens & Buydens, 2007). The training is completed when the distances between each node's weight and the weights of the represented samples no longer decrease and the graph reaches a minimum plateau. This point of convergence is reached just before 8000 iterations.

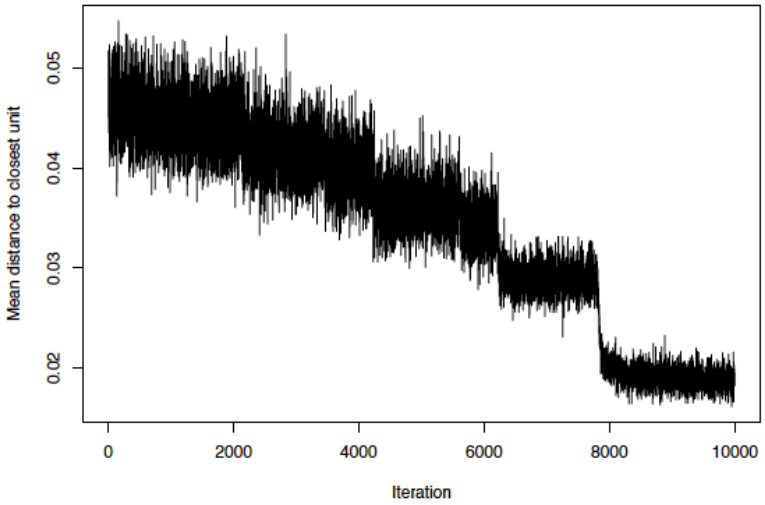

Figure 5.1: Change plot

Determining size of the grid

Different size maps were investigated. A 3X3 grid was initially used, as most nodes had at least 20 objects mapped. There was, however, too large a variance between the nodes with the highest number of objects (N=35) and the nodes with the lowest number of objects (N=5). The grid size was then increased incrementally; an 8X8 grid provided the best representation with a more equal number of objects assigned to each node. The counts plot in Figure 5.2 displays the 8X8 grid. Most nodes have 2-4 objects mapped. One node, displayed in red, has 10 objects mapped and one is empty. An 8X8 grid was selected for the SOM due to the small variance in the number of objects mapped to each node.

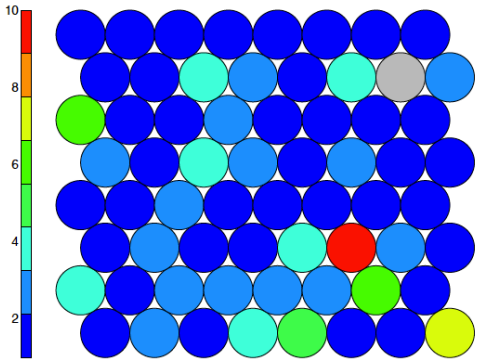

Figure 5.2: Counts plot

The quality plot, displayed in Figure 5.3, shows the mean distance of objects mapped to a unit to the codebook vector of that unit. Smaller distances indicate a better representation by the codebook vectors. The mean distance to the closest unit in the map is 0.41. Distances are small across most areas, which can be seen in nodes displayed in the blue colours in the map, indicating a suitable quality of mapping. The quality plot supported the use of an 8X8 grid in the SOM analysis.

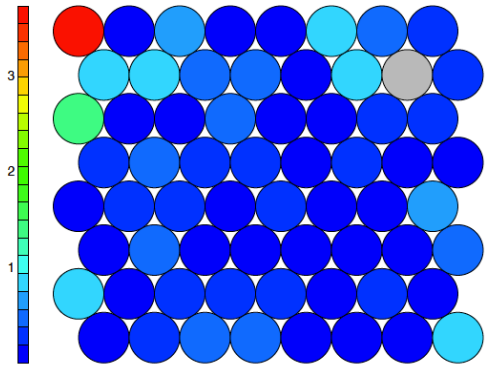

Figure 5.3: Quality plot

Heatmaps

The heatmaps in Figure 5.4 illustrate the distribution of each Cassandra Axis across the map. The relationship between variables can be examined by comparing the shaded nodes for each map. Similarity of patterns indicates monotonic relationships between the axes (Mostafa, 2009). The colour scales to the left of each heatmap show that cooler colours (blues and greens) represent a low rating whilst warmer colours (yellows and reds) represent a high rating.

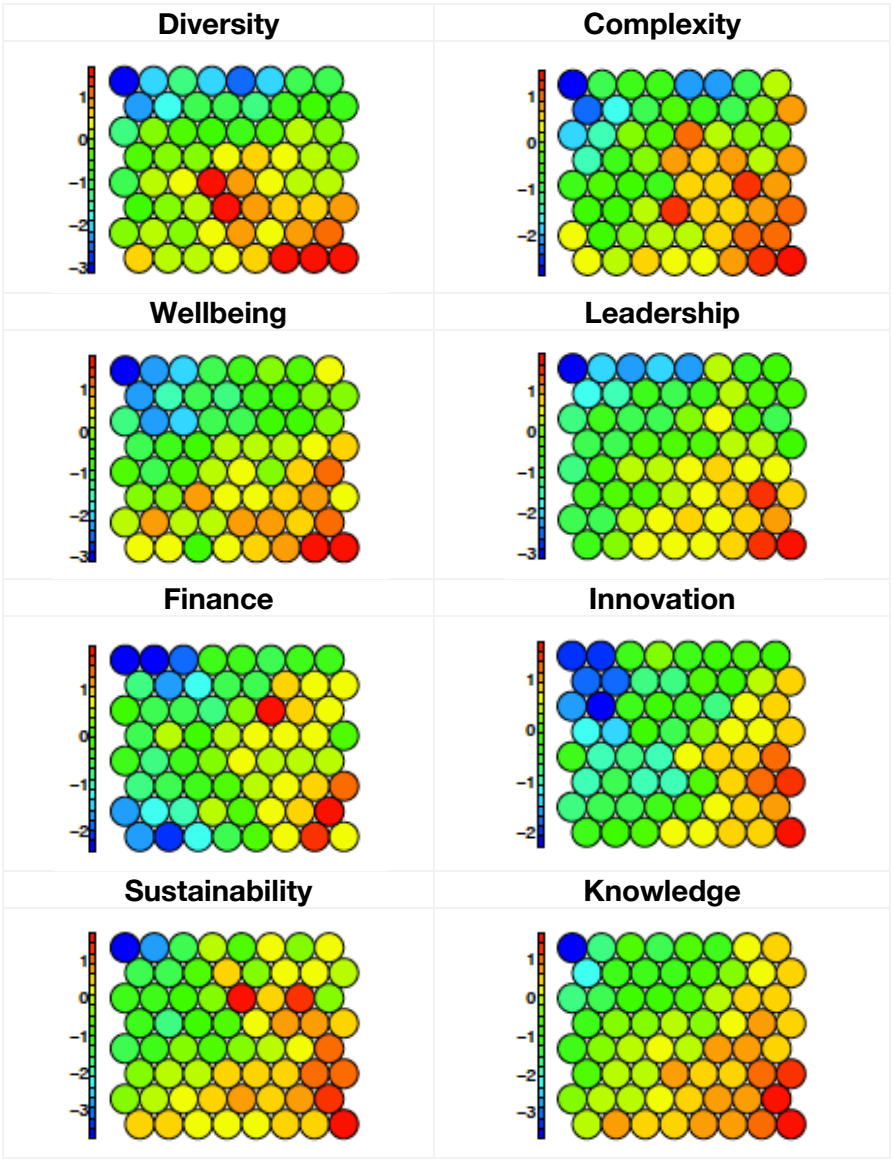

Figure 5.4: Heatmaps[14]

[14] Cassandra axes have been abbreviated as follows: Diversity = Diversity; Complexity = Complexity; Wellbeing = Personal Wellbeing; Leadership = Leadership and Teamwork; Finance = Financial Performance; Innovation = Innovation Potential; Sustainability = Sustainable Development and Social Responsibility; Knowledge = Knowledge and Learning.

The representation of the data in the heatmaps in Figure 5.4 shows similar patterns, with subtle differences across the axes. The spread of warm colours, indicating high ratings, radiate out further from the bottom right corner of the maps in the sustainability, complexity and diversity axes.

The cool colours, indicating low ratings, can be seen in two regions in the finance axis, and are more concentrated in the innovation axis. There is a horizontal spread in the cooler colours from the left top corner of the maps in the complexity, diversity and leadership axes.

The complexity and diversity maps are most alike, with similar but not identical distribution of both warm and cool colours. Theoretically this is interesting, as the rich interaction of diverse agents is a key feature of complex adaptive systems (Cilliers, 1998; Morin, 2008; Stacey, 2010). The heatmaps will be further explored through comparison of the clusters identified in the data.

Determining the number of clusters

A hierarchical cluster analysis with Euclidean distances, using complete linkages, was conducted. The results are displayed in the dendogram in Figure 5.5. The red dotted line indicates the height at which the number of clusters was defined. The position was selected to retain sufficient diversity in the data. This resulted in six clusters, five of which are represented by a large number of cases, and one of which only includes three cases which had particularly low ratings.

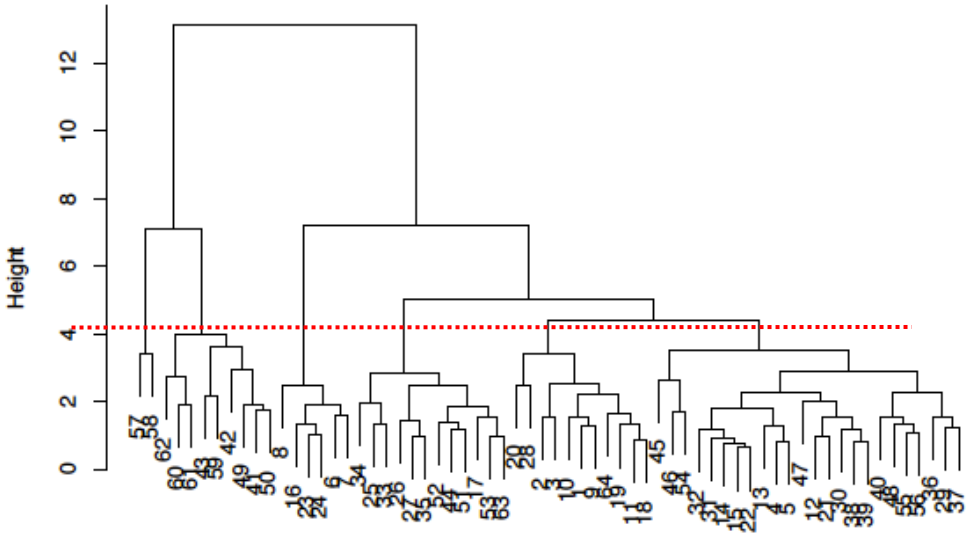

Figure 5.5: Dendogram

Identifying the clusters

The six clusters are displayed in the codebook vector plot (Figure 5.6). The circles in each node indicate the number of objects (respondents) mapped against each node. This figure displays the relative weighting of each node and is examined alongside the heatmaps with cluster boundaries (Figure 5.7) and mean scores displayed in Table 5.4.

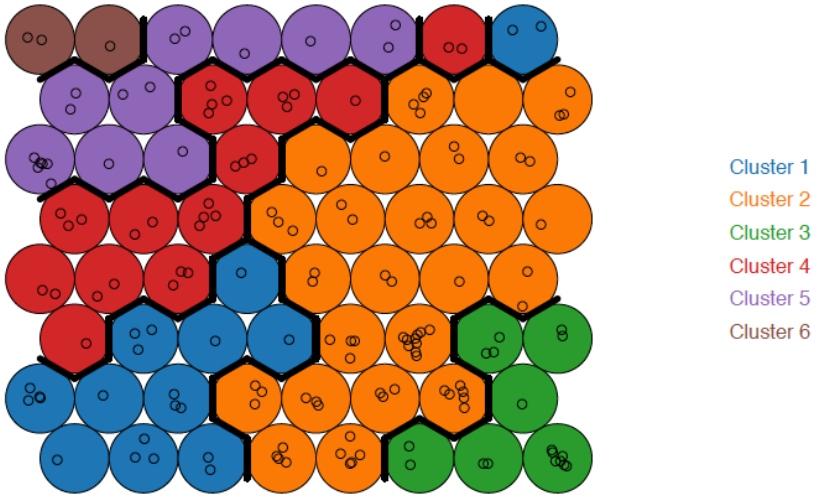

Figure 5.6: Codebook vector object mapping

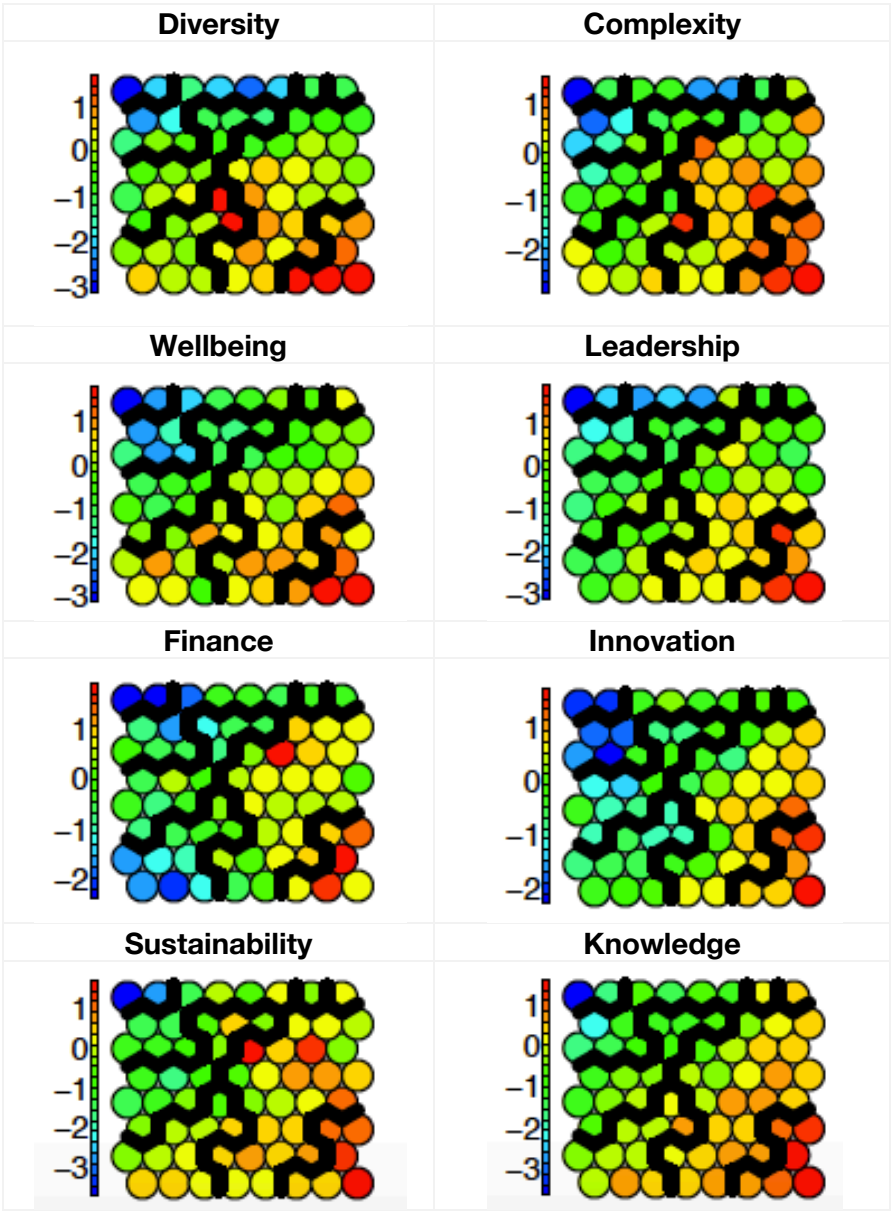

Figure 5.7: Heatmaps with cluster boundaries

Cluster	Freq.	Div.	Com.	Well.	Lead.	Fin.	Inn.	Sustain.	Know.	Mean
1	22	4.64	4.34	4.60	4.07	3.35	3.68	4.53	4.32	4.19
2	69	4.82	4.75	4.74	4.57	4.81	4.60	4.80	4.57	4.71
3	17	5.63	5.50	5.56	5.52	5.35	5.45	5.28	5.29	5.45
4	30	4.12	3.75	3.77	3.63	3.91	3.52	4.06	3.75	3.81
5	18	3.26	2.80	3.16	3.12	3.76	3.02	3.80	3.15	3.26
6	3	1.89	2.14	1.72	1.50	2.27	2.24	2.20	1.94	1.99
Mean		4.54	4.30	4.40	4.23	4.30	4.12	4.49	4.24	

Table 5.4: Cluster means[15]

[15] Cassandra axes have been abbreviated as follows: Div. = Diversity; Com. = Complexity; Well. = Personal Wellbeing; Lead. = Leadership and Teamwork; Fin. = Financial Performance; Inn. = Innovation Potential; Sustain. = Sustainable Development and Social Responsibility; Know. = Knowledge and Learning.

Cluster weights

The cluster weights are displayed in Figure 5.8. Note that five of the six clusters have a substantial weight. Cluster 6, which only represents three respondents, has a weight of 1.89%.

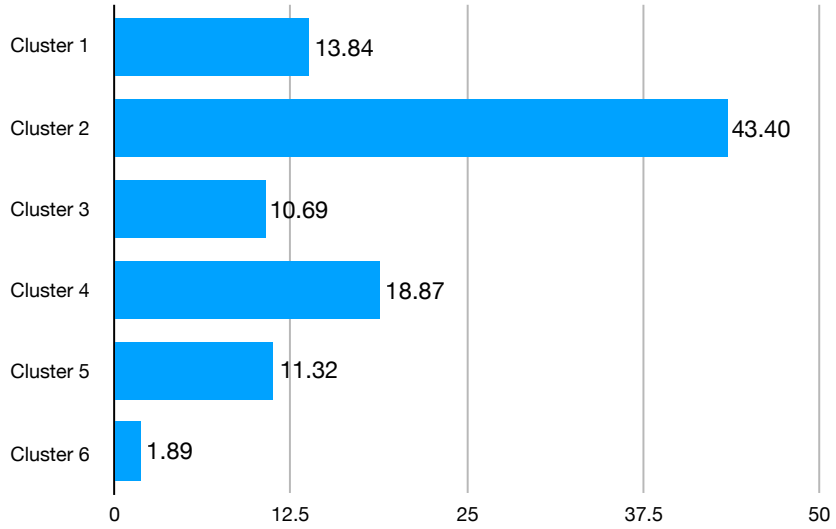

Figure 5.8: Cluster weights (%)

Outliers

Cluster 6 has outlying respondents. The top left node in the matrix is quite removed from the other nodes, as can be seen in the neighbourhood distance plot (Figure 5.9). Units in the top left node are removed from the codebook vector. Following a complexity paradigm, the researcher sought to include outlying values since these are important when studying complex adaptive systems. Whilst self-organising maps can be used to identify outliers, Scarborough and Somers (2006) suggest that outlying values are removed prior to the analysis. To test the robustness and reliability of the result, a test was conducted in which the self-organising map was run off the same seed without the three outlying cases. Whilst there was a slight shift in the map towards the minimum node, the structure of the clustering was preserved for the most part. The outlying data were thus retained in the analysis.

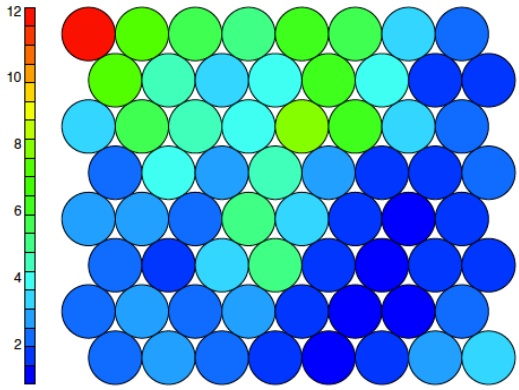

Figure 5.9: Neighbourhood distance plot

5.3.7 Level of coherence

The level of coherence, as discussed in chapter 2, is an important aspect of emergence. Emergence requires novelty but also coherence in structures, patterns and properties of a complex adaptive system (Goldstein, 1999), which arise through the interaction of many agents across the system (Goldstein, 1999; Stacey, 2010).

Figure 5.10 displays the mean scores of each cluster in solid lines and the overall mean in the dotted line. The level of coherence increases as the cluster means converge. There is a moderate level of coherence with six points of coherence emerging in the dataset. The points of coherence are indicated with ellipses.

The means of clusters one, four and five converge in the finance axis (marked with a red ellipse). These combined axes account for 44.03% of the weighting. The means of clusters one, two and four converge in the diversity axis, with a combined weighting of 76.11% (marked with a blue ellipse). Wellbeing has two clusters (one and two) converging with a combined weighting of 57.24% (marked with an orange ellipse).

The sustainability axis sees the first five clusters (combined weighting of 98.11%) coming together forming a zone of coherence which is marked with a green ellipse. Whilst this is only a moderate level of coherence, the standard deviation for clusters 1-5 is 0.59 for the sustainability axis, whereas the other axes for the same clusters fall between 0.82 and 1.02.

The innovation and knowledge axes have minor points of coherence, with two clusters converging marked with purple and yellow ellipses respectively.

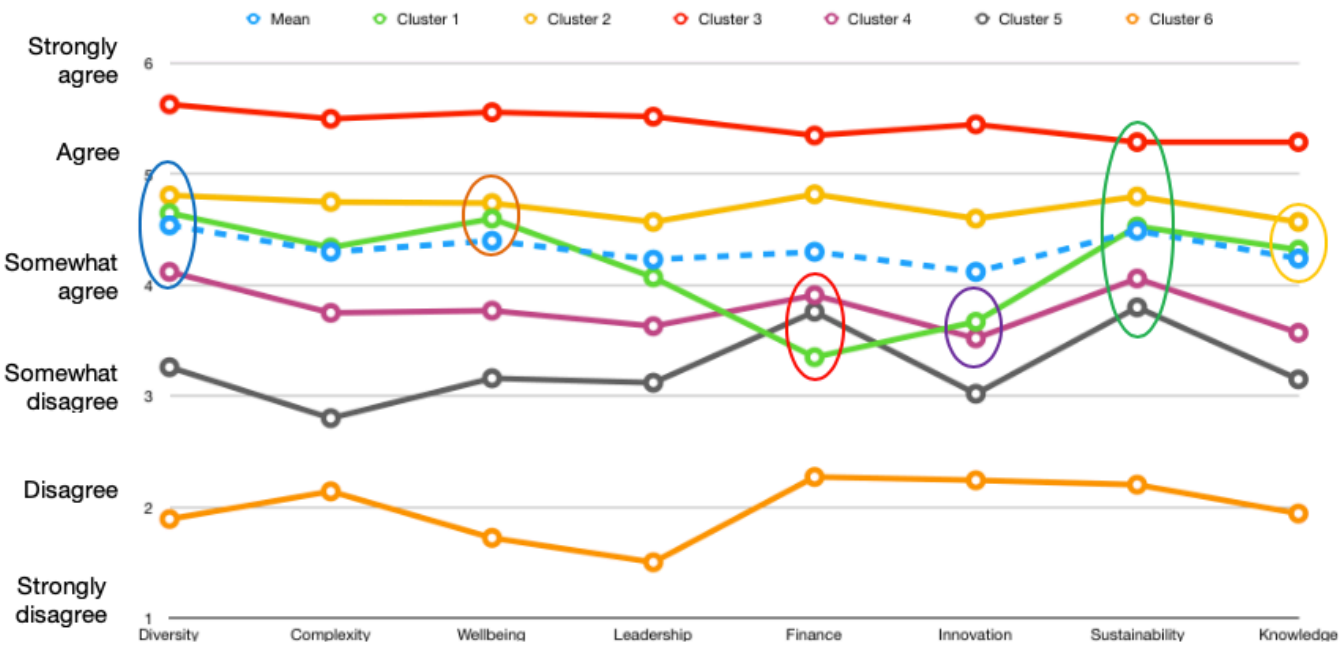

Figure 5.10: Cluster and sample means

Having some points of coherence on the majority of the axes provides a good indication of rich interconnections between social networks in the organisation, resulting in greater coherence which is hypothesised to enhance the emergence of sustainability in the organisation. The clusters will now be examined in detail, identifying key demographic differentiators per cluster.

5.3.8 Cluster 1: Pivots

The scores of cluster 1 for each axis, as well as the overall mean scores, are displayed in Figure 5.11. Cluster 1 is mostly on or just above the mean, following a similar pattern to the majority view (cluster 2), except for the finance and innovation axes where the scores fall below the mean. The highest score is the diversity axis (4.65), followed closely by the wellbeing axis (4.60). Respondents from this cluster have an optimistic view of sustainability, which falls very close to the mean. This cluster has a 13.84% weighting.

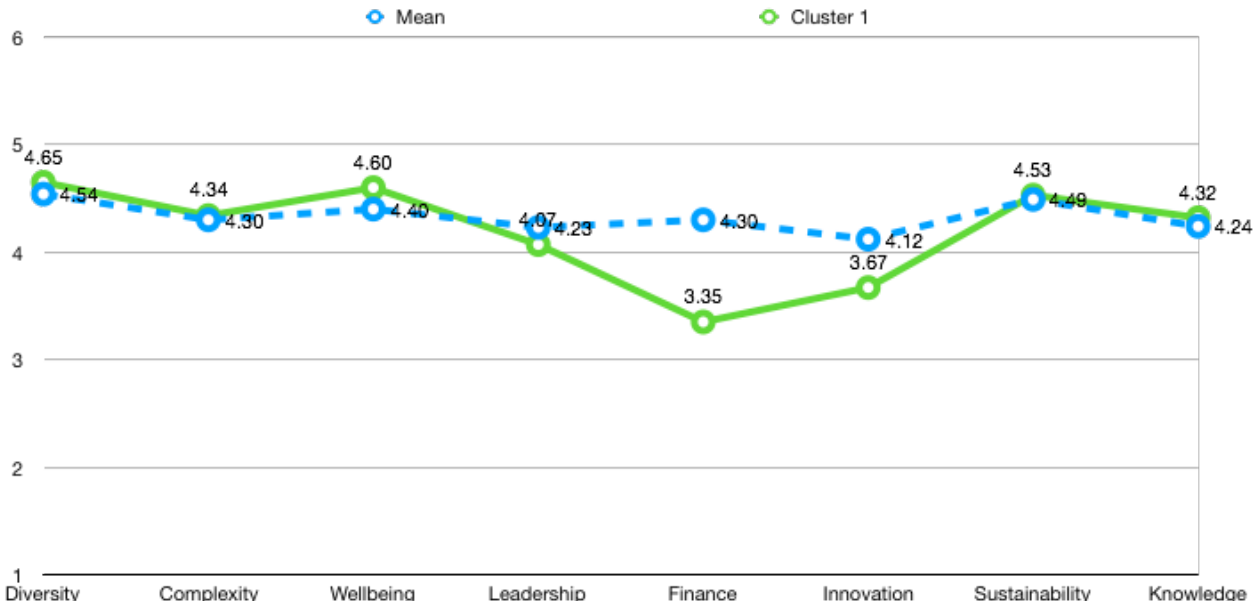

Figure 5.11: Cluster 1 mean scores

The heatmap nodes for the cluster in Figure 5.7 were explored. Nodes with a more optimistic outlook (warmer colours) emerge together in the complexity and wellbeing axes. The knowledge and sustainability axes form a similar optimistic pattern.

Whilst the finance and innovation axes both have cooler colours in the maps, the lowest ratings are in opposite sections of the clusters, indicating that the most critical ratings were applied by respondents to only one of the two axes.

The analysis focuses on demographic fields that help to differentiate the respondents in this cluster. There is a slightly higher representation of females (63.64%) than in the overall sample (56.60%); 27.27% of respondents from this cluster have 3-5 years of service at the company compared with 16.98% of the overall sample.

Respondents from cluster 1 are more likely to be from middle management and have marginally more representation from the executive level than the overall sample. The representation of this cluster per level of management is displayed in Figure 5.12.

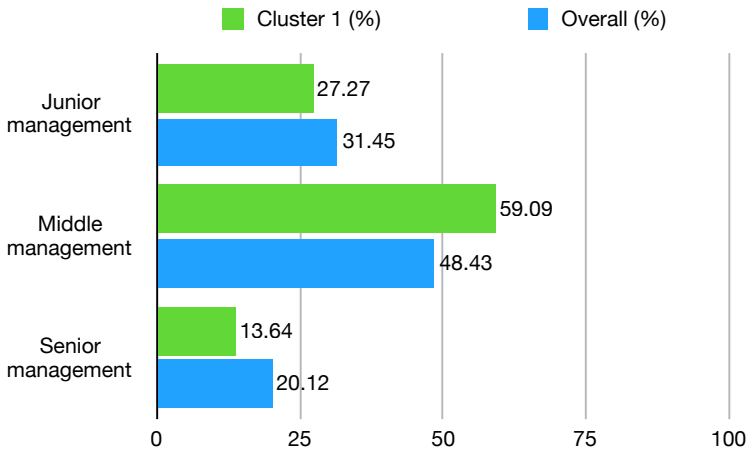

Figure 5.12: Cluster 1 management levels (%)

The level of education for Cluster 1 is displayed in Figure 5.13. There is a higher representation from respondents with a diploma or degree than in the overall sample, yet respondents from this cluster are less likely to hold a post-graduate qualification.

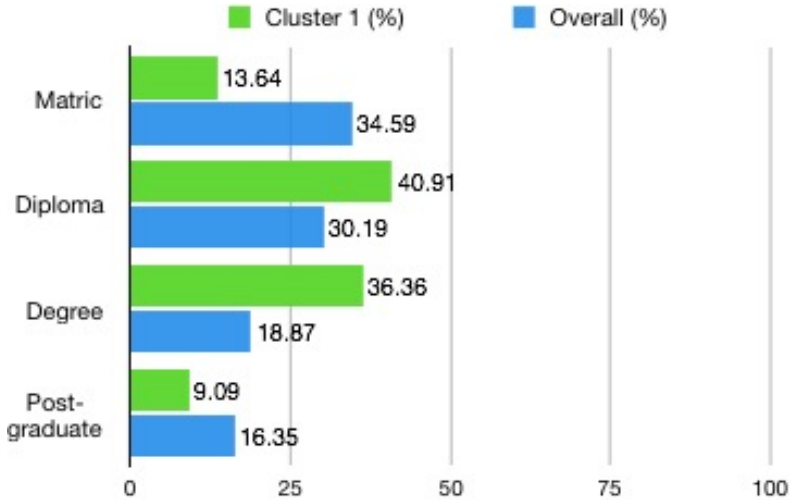

Figure 5.13: Cluster 1 education level (%)

Age categories are displayed in Figure 5.14. Respondents from the 35-44 age category are more strongly represented in this cluster (59.09%) than in the overall sample (41.51%). This pattern is reversed for the 45-54 age category which has a lower representation than the overall sample.

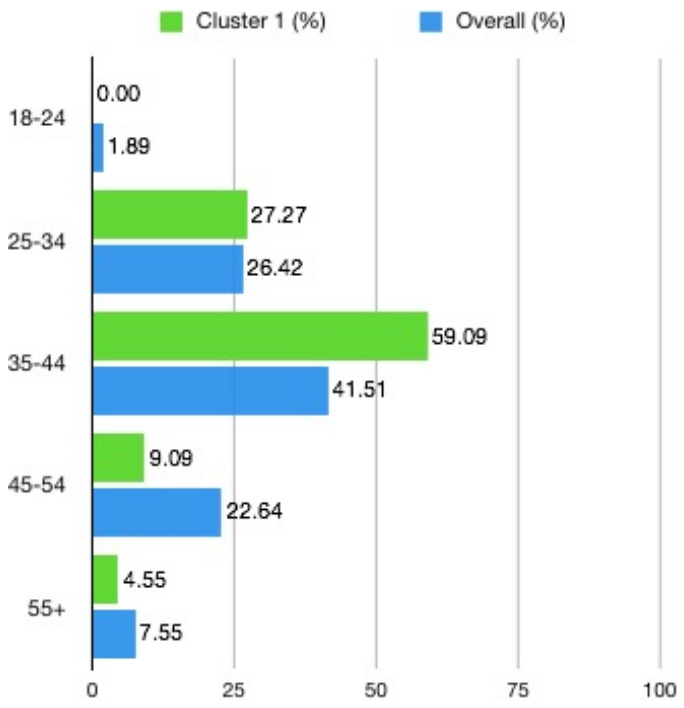

Figure 5.14: Cluster 1 age categories (%)

Interestingly, this cluster has a very high representation from head office (86.39%) as opposed to the overall sample (54.73%). Figure 5.15 gives a spatial view of divisional representation. Notice the small retail representation and substantial representation from various head office divisions.

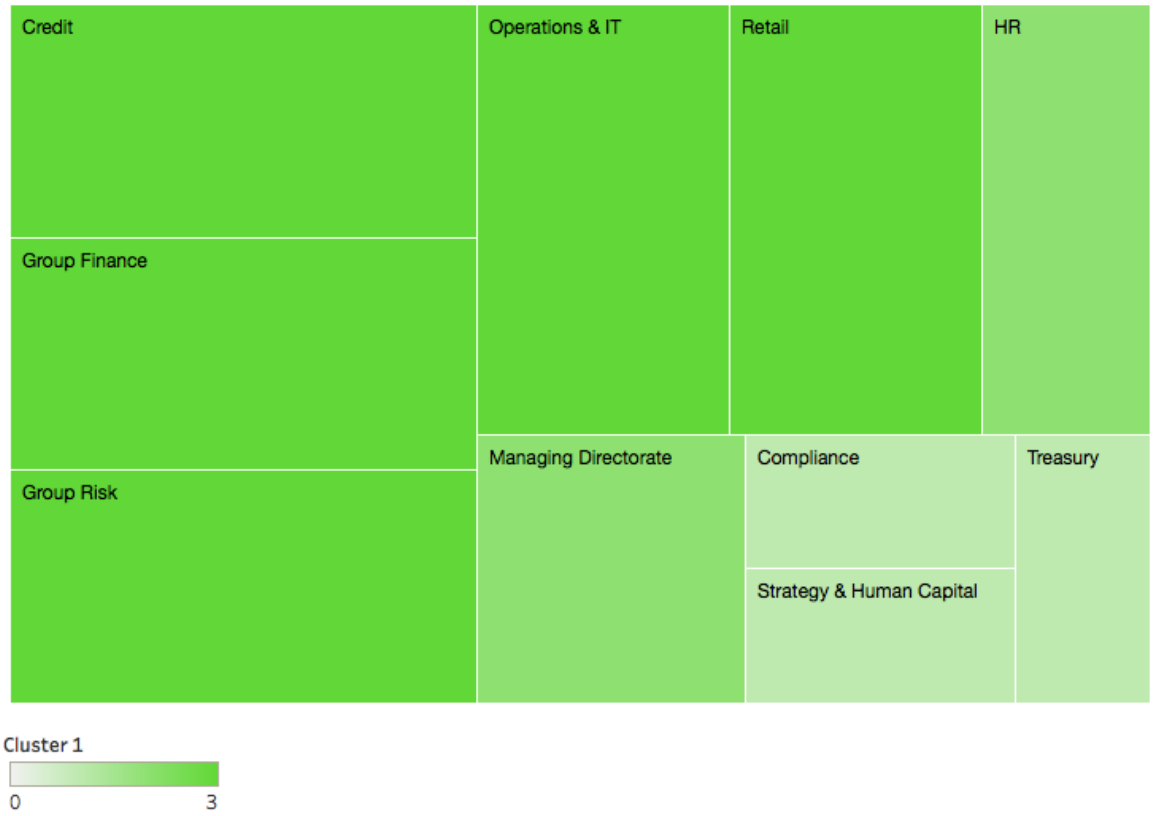

Figure 5.15: Cluster 1 divisions

The cluster is named “pivots” as it has a similar rating pattern as the majority view (cluster 2) on five axes, and the less optimistic clusters (4 & 5) for the other two axes (finance and innovation). The members of this cluster, who tend to be middle managers in head office, join with other clusters at four points of coherence and thus have the potential to bring together different interest groups and pivot towards a more sustainable future. This offers the group leverage to influence other clusters and frame dialogue in a way that multiple interest groups can relate to.

It is interesting that this cluster is so heavily weighted towards head office (86.39%), perhaps emphasising the importance of head office in establishing and engaging a wide range of stakeholders in sustainability strategies and initiatives.

5.3.9 Cluster 2: Guardians

The scores of cluster 2 for each axis, as well as the overall mean scores, are displayed in Figure 5.16. All scores in this cluster are above the mean. The highest score is finance (4.82), followed closely by sustainability (4.80). The lowest scores are leadership and knowledge management, which are both rated at 4.57. This cluster has the highest weighting with 43.40% of the dataset falling in the cluster. Respondents from this cluster have an optimistic view across all axes.

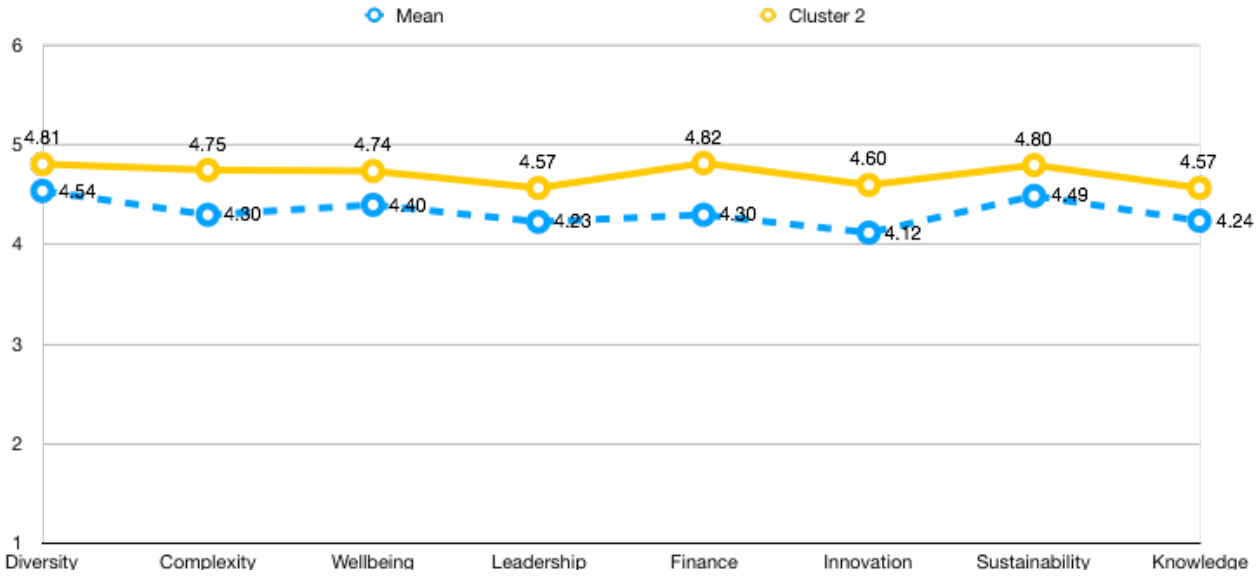

Figure 5.16: Cluster 2 mean scores

The heatmap nodes for the cluster in Figure 5.7 were explored. It is interesting to see the similarities between the complexity and sustainability nodes, which both have a broad distribution of warm colours (high ratings). The cooler colours (lower ratings) form similar patterns in the leadership and diversity axes. Nodes in the lower parts of the grid which have moderate to high ratings across most axes are low in the finance and innovation axes.

This cluster has few outlying demographic fields, with the cluster representation mostly matching the distribution across the whole sample. The analysis focuses on demographic fields that help to differentiate the respondents in this cluster. The cluster has slightly fewer respondents from middle management (40.58%) as opposed to 48.43% in the overall sample, as is displayed in Figure 5.17.

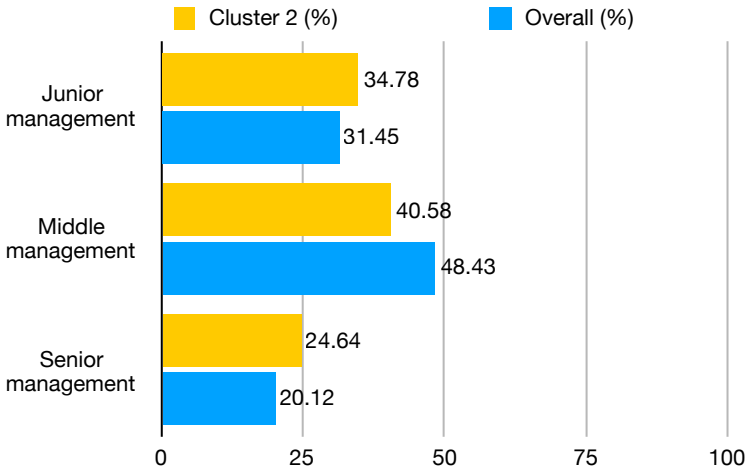

Figure 5.17: Cluster 2 management level (%)

There is a slightly higher representation of matriculates and post-graduates in this cluster than in the overall sample, as is displayed in Figure 5.18.

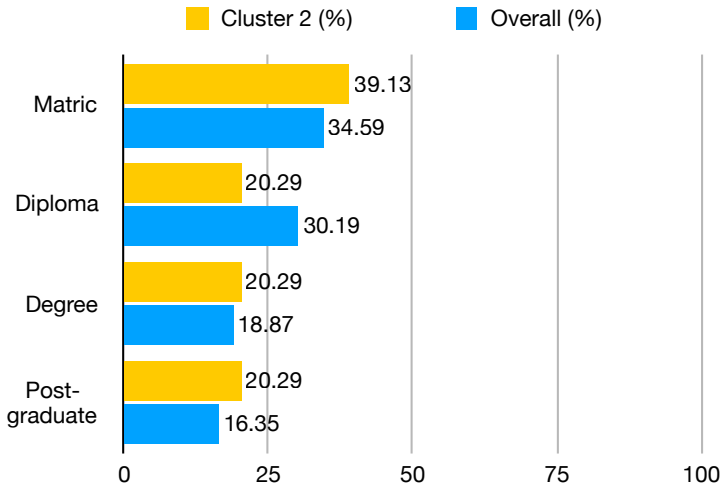

Figure 5.18: Cluster 2 education level (%)

There are slightly more respondents in the cluster from the branch network (49.27%) than in the overall sample (45.27%). The representation per division in this cluster is displayed in

Figure 5.19. Both retail and business banking are well represented in this cluster, as are Group Finance, Group Risk and Operations & IT.

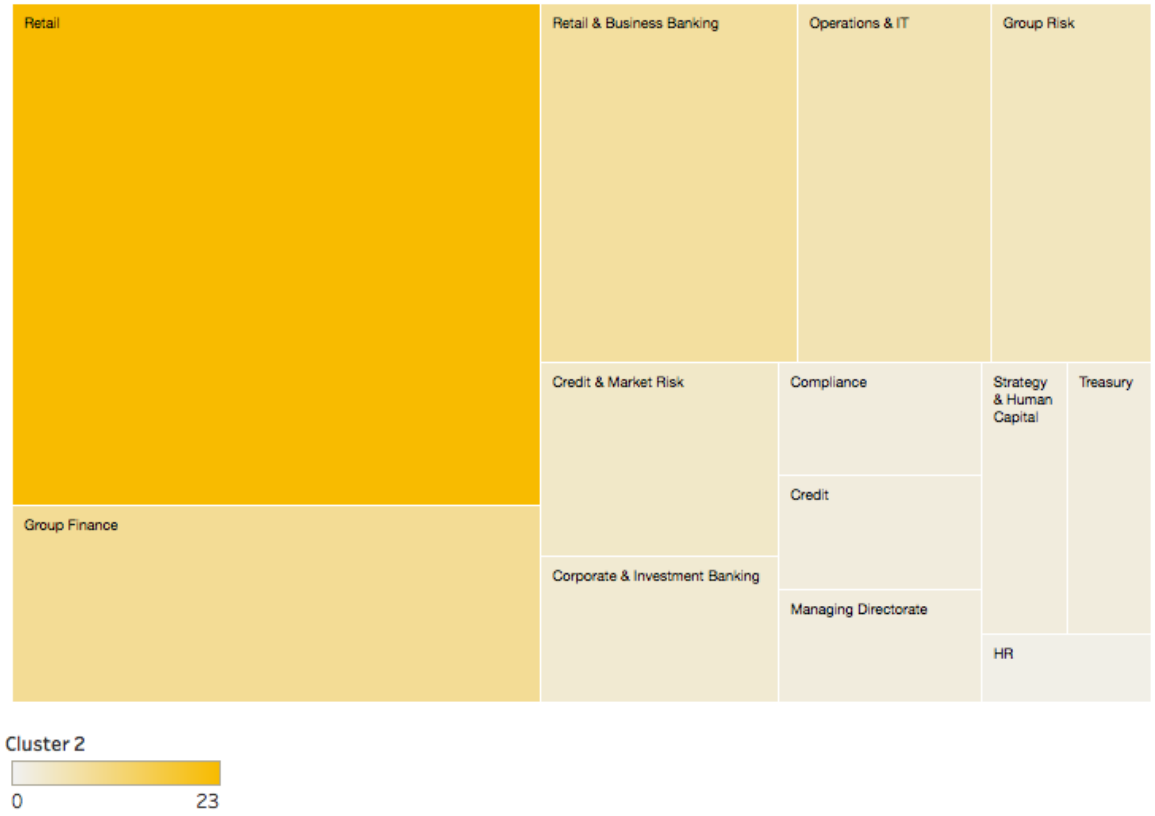

Figure 5.19: Cluster 2 divisions

The cluster is named “guardians” as it has a very optimistic view of the organisation that sits above the mean for all axes, and thus can be seen to be “guardians” or protectors of the status quo. The very high sustainability scores suggest that most employees don’t yet appreciate the magnitude of the transition required to meet the challenges associated with sustainability.

The mainstream view, as represented by this cluster, is optimistic, loyal and protective of the organisation. It is likely that this cluster is less sensitised to a longer-term view of the organisation in the context of the embedded socio-ecological-economic system in which it operates. It is interesting that this emerges despite a higher proportion of post-graduate education than in the overall sample.

5.3.10 Cluster 3: Praise singers

The scores for cluster 3 for each axis, as well as the overall mean scores, are displayed in Figure 5.20. All scores in this cluster are well above the mean. The highest score is wellbeing (5.56), followed closely by leadership (5.52). The sustainability and knowledge axes are marginally lower than the rest of the scores (5.29). There is a low level of differentiation between axes. This cluster has a 10.69% weighting.

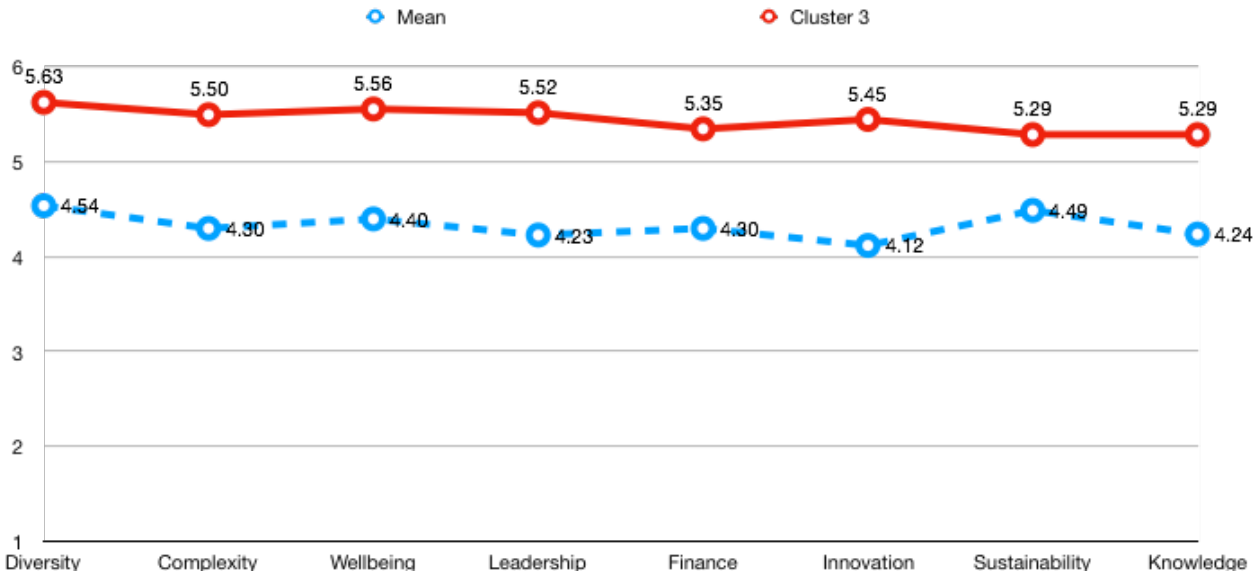

Figure 5.20: Cluster 3 mean scores

The heatmap nodes for the cluster, as depicted in Figure 5.7, were explored. There are similarities in the nodes in sustainability and innovation, and leadership and wellbeing.

The analysis focuses on demographic fields that help to differentiate the respondents in this cluster. The cluster has slightly more male respondents (47.06%) than the overall sample (43.06%). It has more respondents from a junior management level (41.18%) than the overall sample (31.45%), as displayed in Figure 5.21.

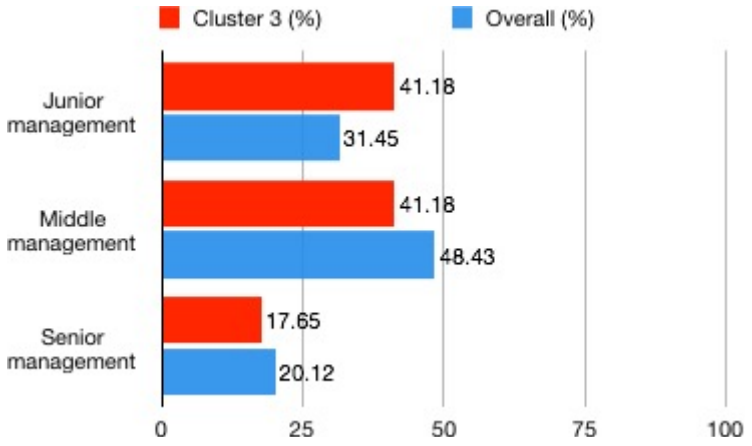

Figure 5.21: Cluster 3 management level (%)

There is a higher representation of respondents with a diploma in this cluster than in the overall sample, and fewer post-graduates than in the overall sample, as is displayed in Figure 5.22.

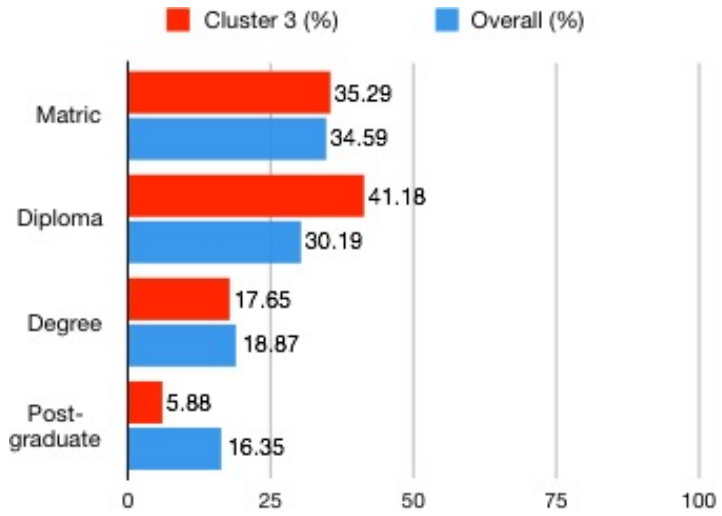

Figure 5.22: Cluster 3 education level (%)

It is interesting to note that there is a higher percentage of respondents in this cluster who have been with the organisation for less than one year or more than five years, as displayed in Figure 5.23.

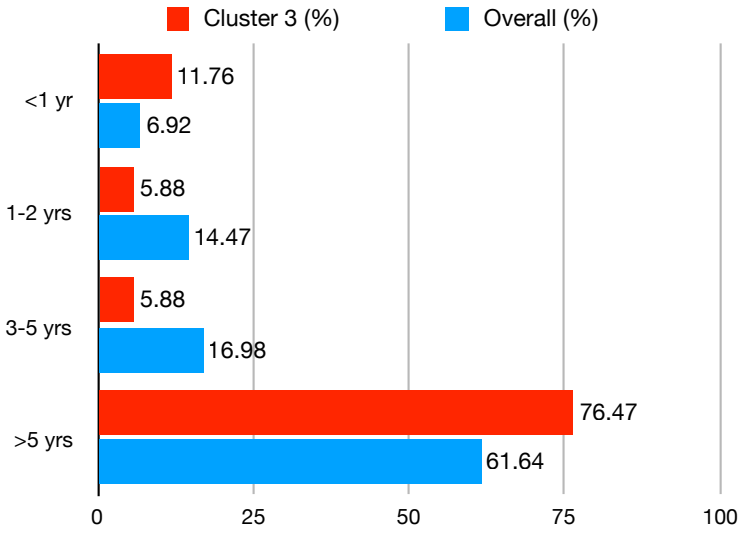

Figure 5.23: Cluster 3 tenure (%)

There are slightly more respondents in the cluster from the branch network (52.93%) than in the overall sample (45.27%). The representation per division in this cluster is displayed in Figure 5.24. Both retail and business banking are well represented in this cluster, as are Group Risk and Operations & IT.

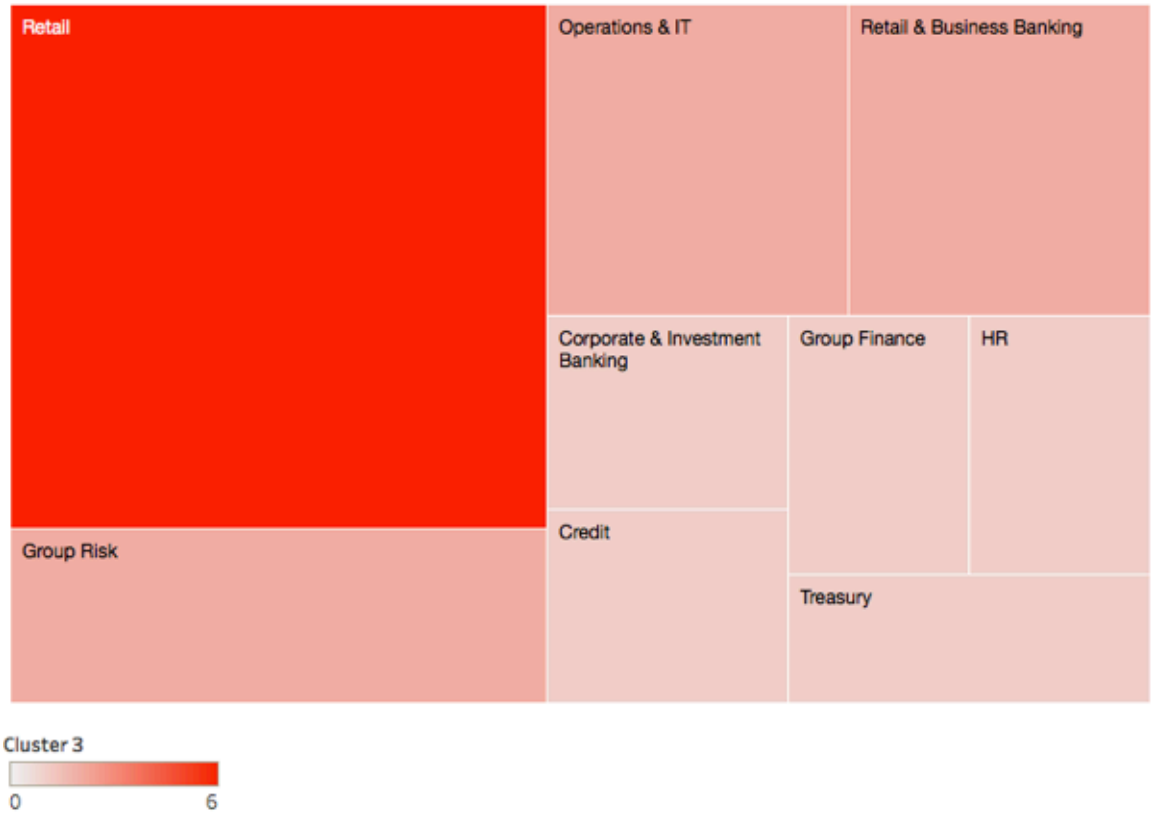

Figure 5.24: Cluster 3 divisions

The cluster is named “praise singers” as the ratings for all of the axes are well above the mean, with a low differentiation of rating across the axes. The cluster tends to be from more junior levels of management who are either very new to the organisation or have been employed for more than 5 years. Whilst the sustainability axis was the lowest rated alongside knowledge management, the score is still much higher than for any other cluster and there seems to be a disconnect between the perceptions of this cluster and the perceptions of other clusters. The metaphor of praise singer provides a potentially useful framing of this cluster’s perspective on stretching the boundaries of dialogue in transitioning towards a sustainable future.

5.3.11 Cluster 4: Devil’s advocate

The scores for cluster 4 for each axis, as well as the overall mean scores, are displayed in Figure 5.25. All scores in this cluster fall below the mean. The highest score is diversity (4.12), followed by sustainability (4.06) and finance (3.91). Innovation potential (3.52) and knowledge management (3.57) are the lowest scores. This cluster has an 18.87% weighting.

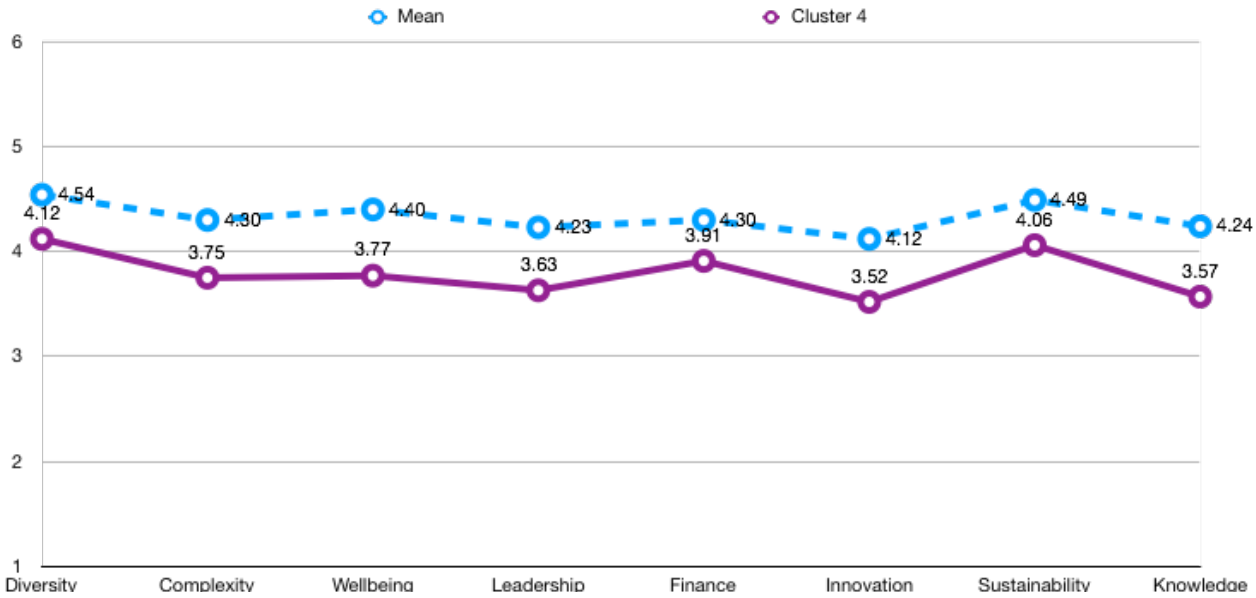

Figure 5.25: Cluster 4 mean scores

The heatmap nodes for the cluster, as depicted in Figure 5.7, were explored. The nodes are fairly similar across all axes. The cooler colours (lower ratings) in the innovation nodes

corresponded to slightly higher ratings (but still low ratings) in the finance axis. The analysis focuses on demographic fields that help to differentiate the respondents in the cluster.

This cluster has the highest proportion of male respondents of all the categories - 73.33% of the respondents in this cluster are male, as opposed to the 43.40% of the overall sample. This cluster has more respondents from a middle and senior management level than the overall sample, as displayed in Figure 5.26.

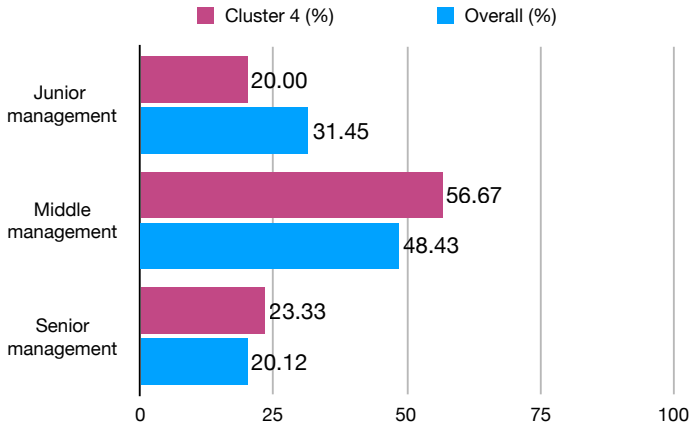

Figure 5.26: Cluster 4 management level (%)

There is a higher representation of matriculants and respondents holding a diploma in this cluster than in the overall sample, and fewer post-graduates than in the overall sample, as is displayed in Figure 5.27.

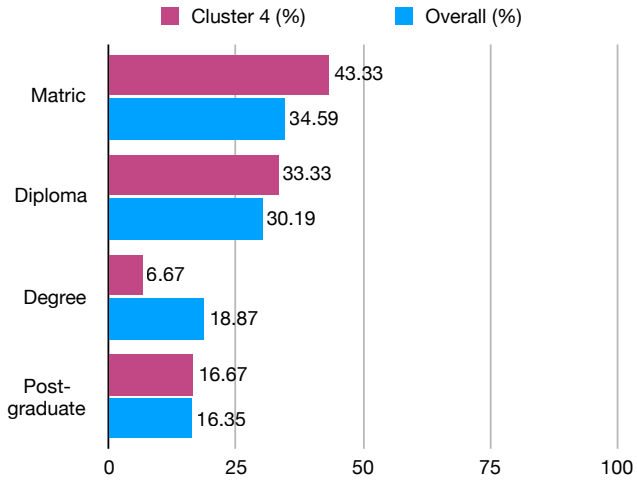

Figure 5.27: Cluster 4 education level (%)

Tenure categories for this cluster are displayed in Figure 5.28. There is a higher representation from new employees and those that have been employed for 3-5 years than in the overall sample. Notice the drop off in the more than five-years category.

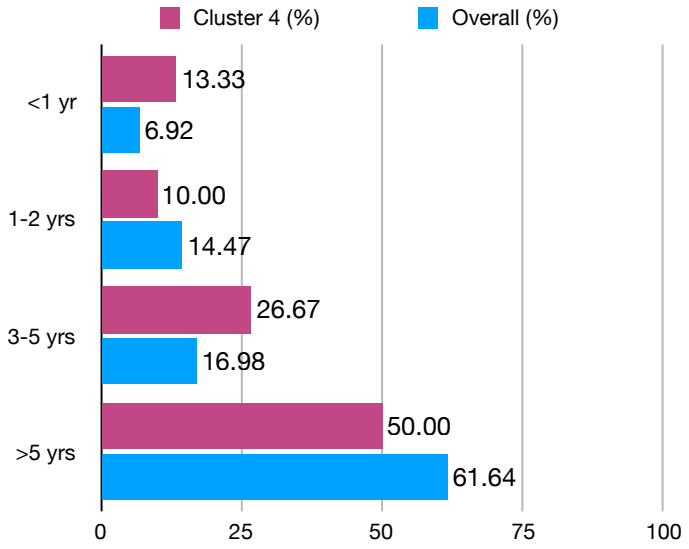

Figure 5.28: Cluster 4 tenure (%)

There are slightly more respondents in the cluster from the head office (56.67%) than in the overall sample (54.73%). The representation per division in this cluster is displayed in Figure 5.29. Note the high representation from retail, business banking corporate and executive banking. Operations and IT and credit are also well represented.

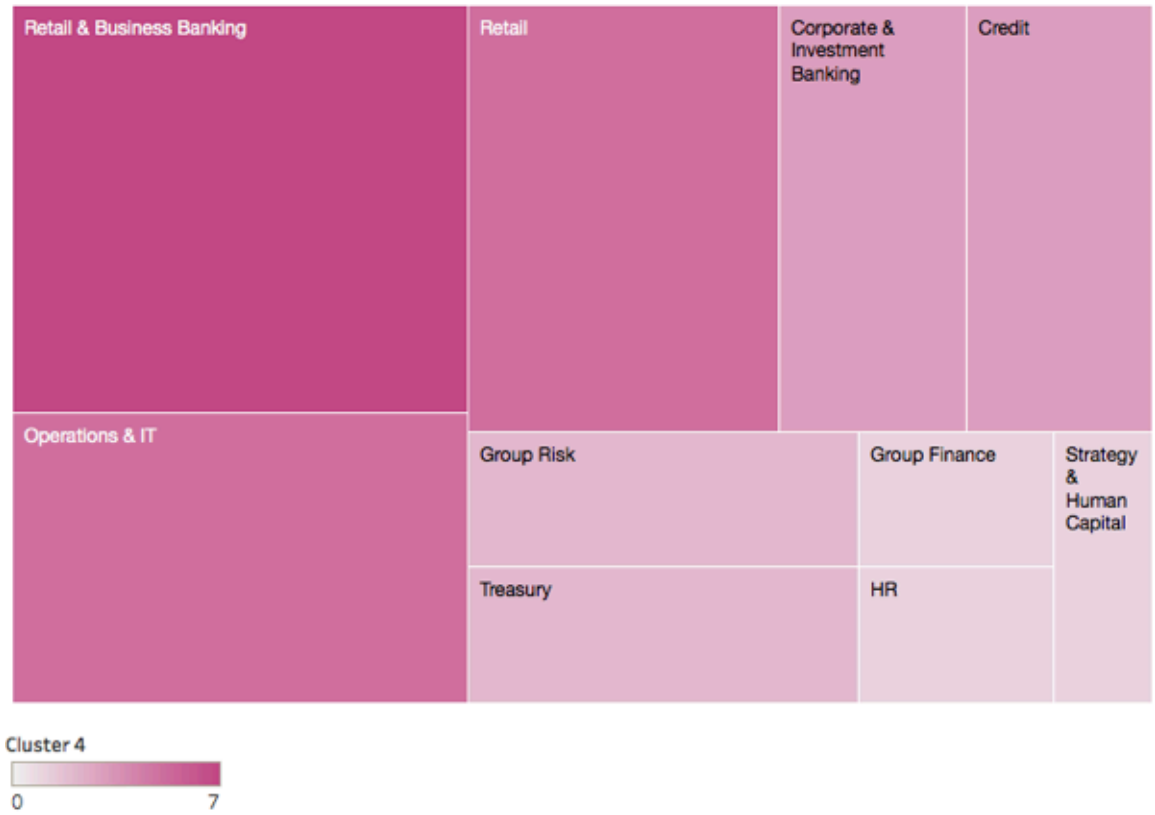

Figure 5.29: Cluster 4 divisions

The cluster is named “devil’s advocate” as the ratings for all the axes are below the mean, with a moderate differentiation of rating across the axes. This position is still fairly close to the mainstream view with a substantial 18.87% cluster weight. Whilst several interpretations are possible, it is likely that the similarity of rating pattern with the mainstream (guardians) emerges as a critical position within a similar perspective to the mainstream. This is supported by the relatively high representation from middle and senior management, as well as the high proportion of male respondents.

The education profile of the cluster is interesting in that there is a higher representation at matriculant and diplomate level with a substantial falloff with respondents with a first degree but not in the post-graduate category. Whilst there are many possible interpretations, this implies at a minimum that critical thinking is not solely dependent on level of education.

5.3.12 Cluster 5: The resistance

The scores for cluster 5 for each axis, as well as the overall mean scores, are displayed in Figure 5.30. All scores in this cluster are below the mean. The highest score is sustainability (3.80), followed closely by finance (3.76). Complexity (2.80) and then innovation potential (3.02) are the lowest scores. This cluster has an 11.32% weighting.

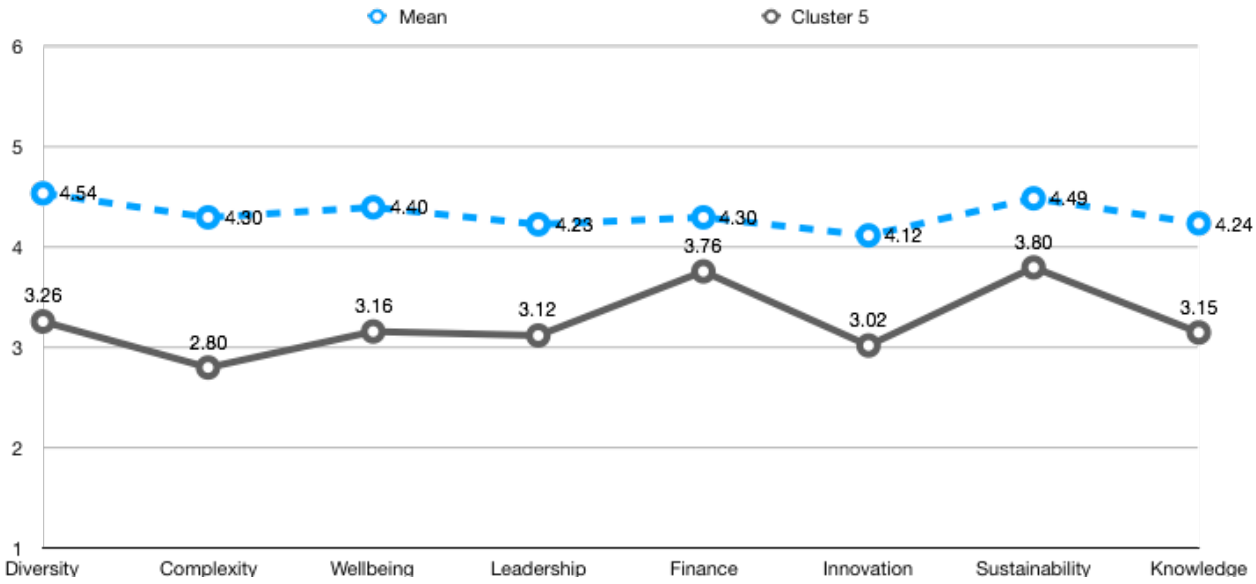

Figure 5.30: Cluster 5 mean scores

The heatmap nodes for the cluster in Figure 5.7 were explored. Nodes with cooler colours (lower ratings) for innovation emerged with low ratings for wellbeing and complexity. In the top right area of the cluster, nodes with a low rating for leadership emerged with complexity and diversity.

The analysis focuses on demographic fields that help to differentiate the respondents in this cluster. There is a higher representation of respondents from the over 55 years category in the cluster (16.67%). There is also a higher representation from the 18-24 age category in the cluster (5.56%) as opposed to the overall sample (1.89%). This cluster has slightly more female respondents (61.11%) than the overall sample (56.60%).

The cluster has more respondents from a junior and management level than the overall sample, as displayed in Figure 5.31.

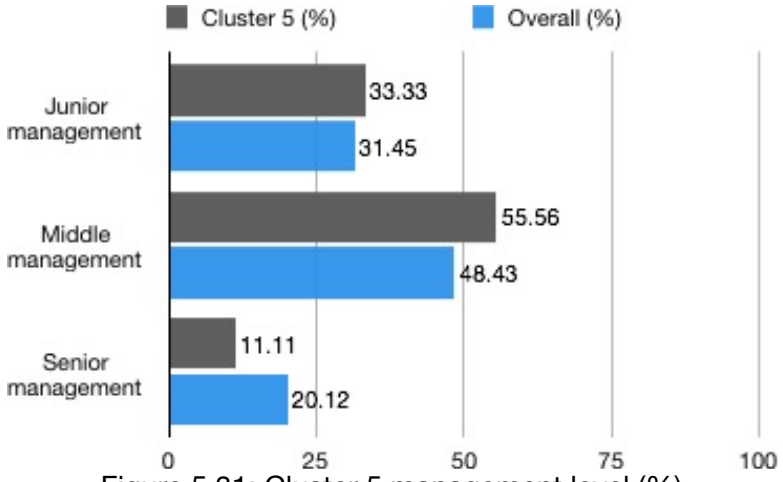

Figure 5.31: Cluster 5 management level (%)

This cluster has a higher representation from the post-graduate and diploma education levels, as can be seen in Figure 5.32.

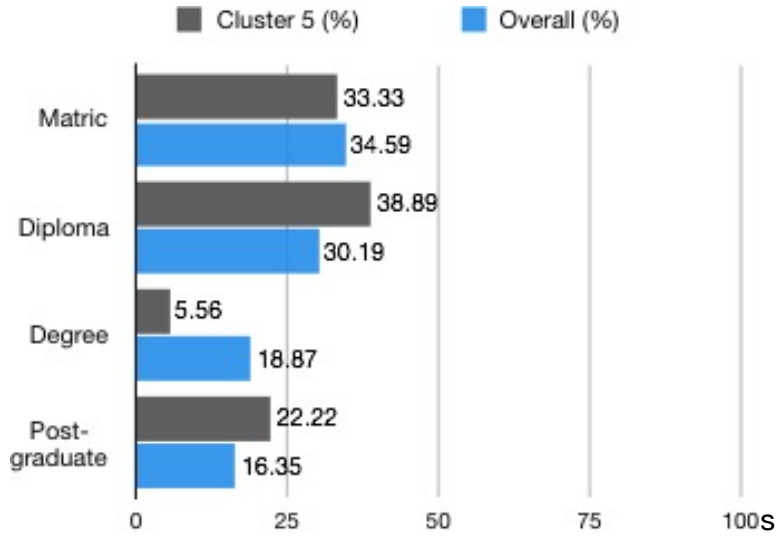

Figure 5.32: Cluster 5 education level (%)

There are slightly more respondents in the cluster from the branch network (55.56%) than in the overall sample (45.28%). The representation per division in this cluster is displayed in Figure 5.33. Note the high representation from retail, business banking corporate and investment banking. Credit, Group Risk and HR are all well represented.

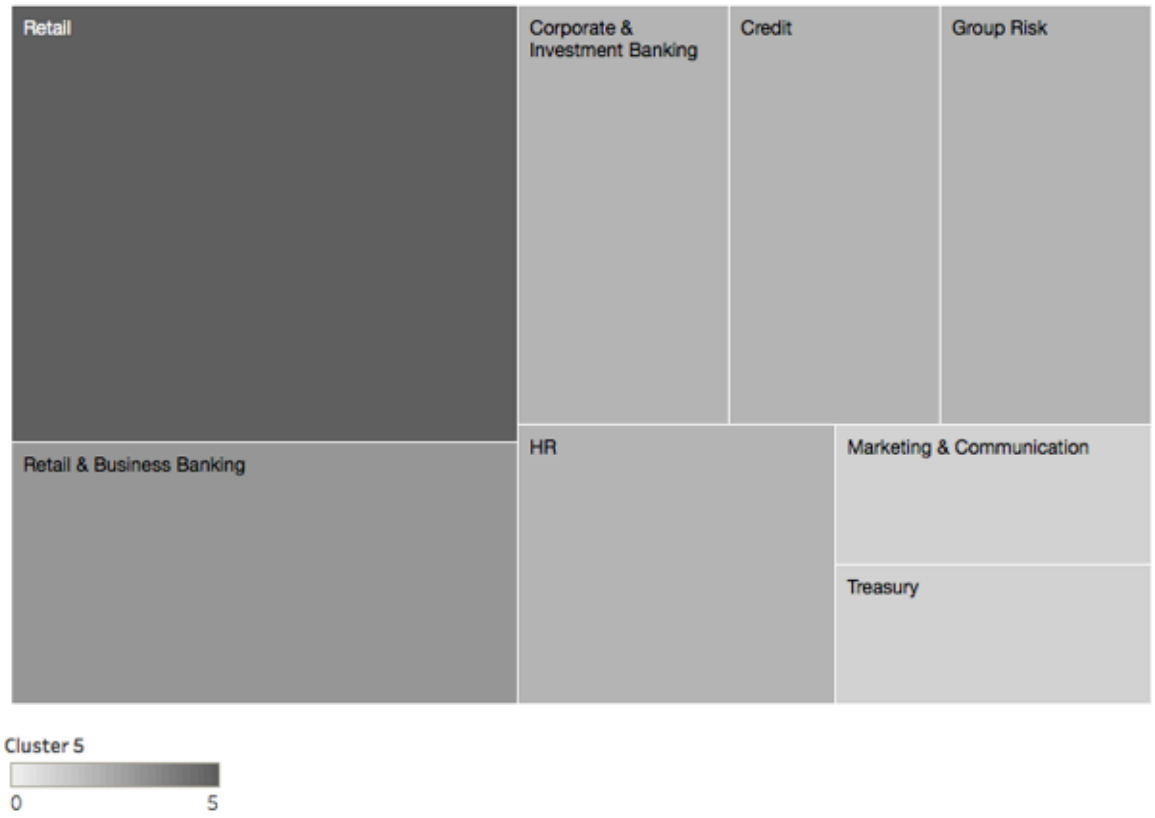

Figure 5.33: Cluster 5 divisions

The cluster is named “the resistance” as the ratings for all the axes are below the mean, with a high differentiation of rating across the axes. Respondents from this cluster have a clear perspective on the organisation and adopt a critical view. More likely to be from middle or junior levels of management with long tenure, these respondents are most critical of the organisation’s capacity for complexity and innovation potential. Whilst there are many possible interpretations such as disenchantment from lack of career progression, the cluster holds the potential to act as a resistance, helping to nudge the organisation towards a more sustainable future. A combination of the youngest and oldest respondents offers a potentially interesting combination of experience with youthful interest in a longer-term future.

5.3.13 Cluster 6: The rebels

The scores for cluster 6 for each axis, as well as the overall mean scores, are displayed in Figure 5.34. This cluster has the most critical ratings, with all ratings falling well below the sample mean. The highest score is finance (2.27), followed closely by innovation (2.24) and sustainability (2.20). Leadership has the lowest score of all axes and clusters (1.50), followed by wellbeing (1.71).

This cluster represents an outlier view, with a very small weight of only 1.89%. Whilst it might be tempting to ignore such a marginal view, employees that have such a critical view of the organisation may be actively disengaged and thus less likely to complete a survey. It is therefore possible that this view is more widespread than indicated by the cluster weighting.

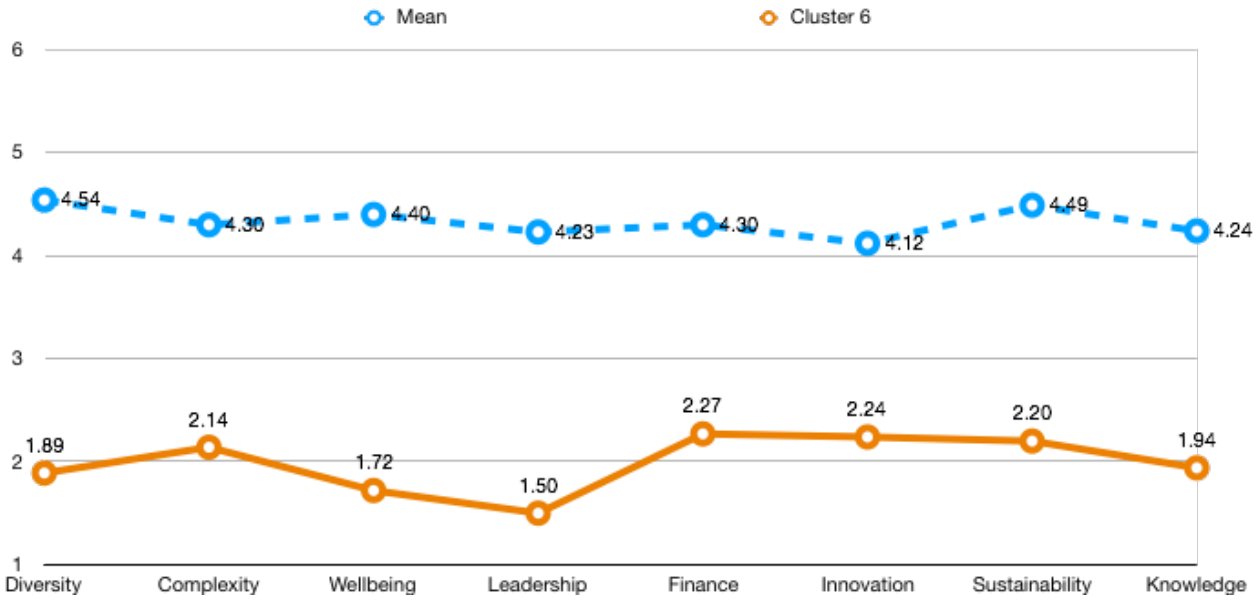

Figure 5.34: Cluster 6 mean scores

This cluster has respondents from junior and middle management levels, as displayed in Figure 5.35.

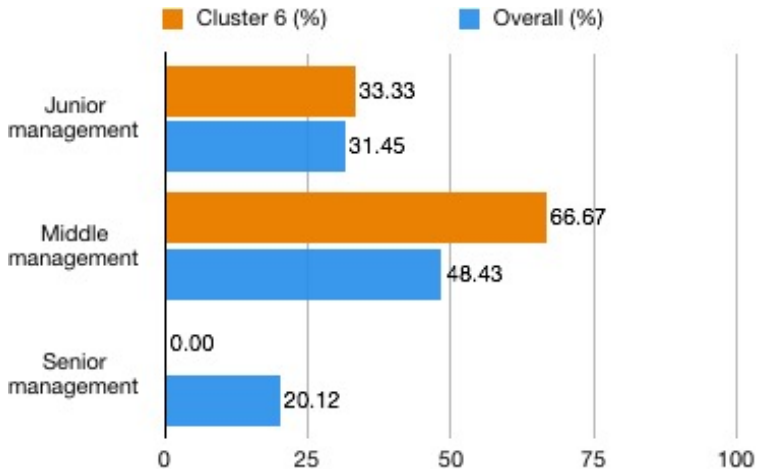

Figure 5.35: Cluster 6 management level (%)

This cluster has respondents who hold diplomas and degrees, as can be seen in Figure 5.36.

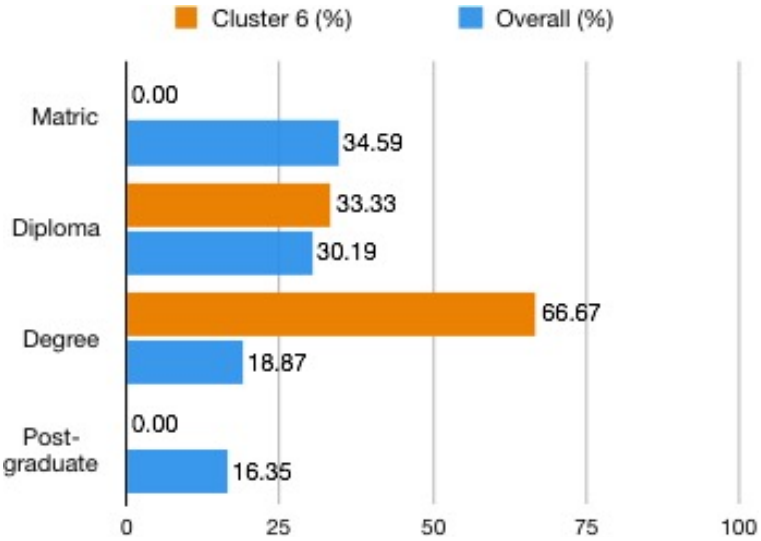

Figure 5.36: Cluster 6 education level (%)

There is equal representation in this cluster from retail, credit and credit and risk management in this cluster, as is displayed in Figure 5.37. There is a higher representation from the head office (66.66%) than the branch network (33.33%).

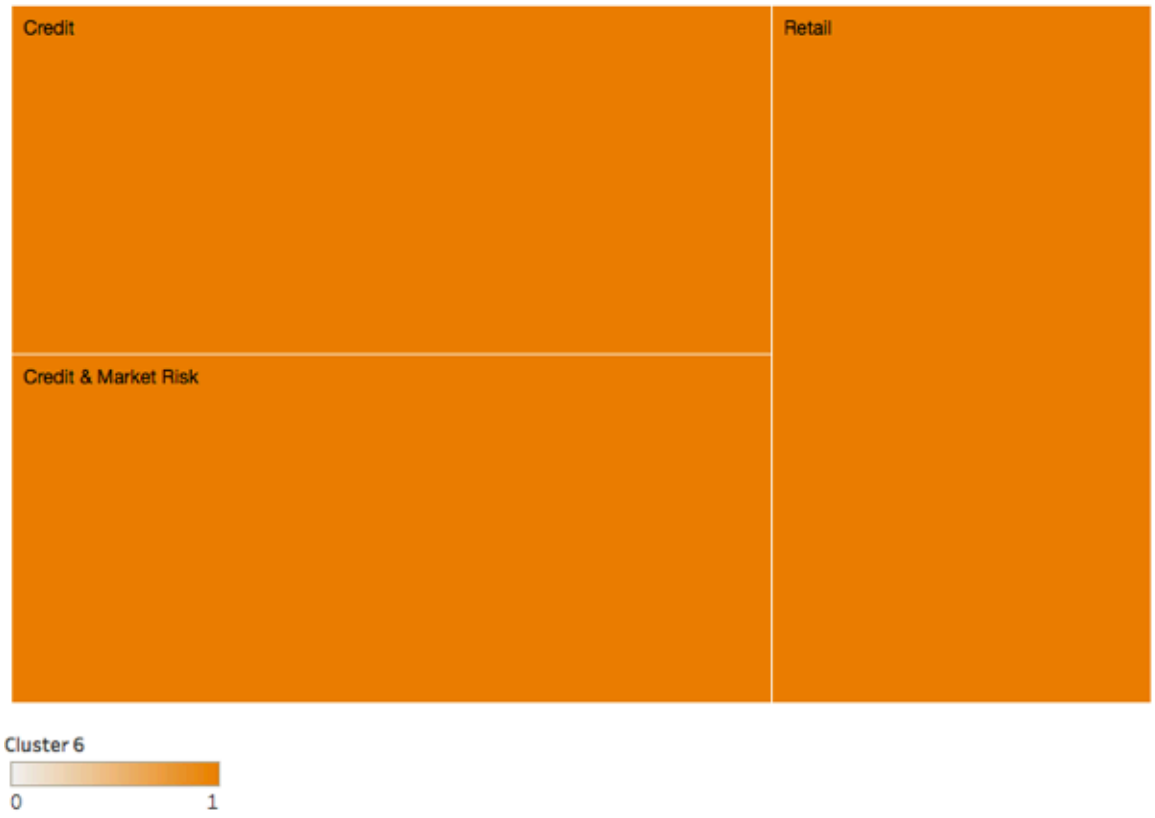

Figure 5.37: Cluster 6 divisions

It is interesting that wellbeing is so low with this cluster (1.72). A low level of personal wellbeing emerges with a lower overall rating across all axes, as opposed to cluster 1 (praise singers) where high scores across all axes emerge with wellbeing as the second highest score in the cluster. This emerges with a very critical view of leadership and teamwork (1.50). The cluster has been named the rebels as the respondents provide an outlying view which is far more critical than the mean and they are likely to have a perspective that is at odds with the current leadership approach.

It is also worth noting that the general pattern across many clusters of high finance and sustainability scores are reflected in this cluster, albeit at a much lower rating. Since this view

is so marginal, or implicit, it is possible that increasing the respondents' sense of wellbeing and agency would unlock a useful perspective in the organisational discourse.

5.3.14 Conclusion

The quantitative findings for Case B were presented. The application of self-organising maps was discussed and the resultant clusters - six in all - were shown and analysed. There was a good balance between the optimistic and more critical clusters. Sustainability and finance emerged together with the most prominent zones of coherence, which were complemented by minor points of coherence across many of the axes. This provides a good indication of rich interconnections in the complex adaptive system which are valuable in co-evolutionary processes and may be inhibited by decoherence in the leadership and complexity axes. The progress towards sustainability was affirmed by the more critical clusters (devil's advocate and the resistance) which both rated sustainability as a relative strength.

In the context of a pluralist epistemology, it is important to allow for the interpretation of the data from multiple perspectives. The qualitative strand of the research sought to achieve this. The chapter will now shift to examine the qualitative findings as a way of explaining, and expanding on, the quantitative results.

5.4 Qualitative findings

In an explanatory sequential design, qualitative data are used to explain the quantitative results (Creswell, 2015). This section will describe the implementation of the qualitative research design and present key findings of Case B. The qualitative data were analysed to explain the emergence of corporate sustainability by situating the clusters and points of coherence in the self-organising maps in the stakeholder narratives of the journey to sustainability. Key dimensions of coherence are identified, as well as conditions and modes of emergence which describe how corporate sustainability is enacted.

5.4.1 Sampling profile

Sampling criteria were discussed and collaboratively applied by the researcher, executive sponsor and other key stakeholders. Purposive sampling was used to identify information-rich

cases in which interviewees were informed about sustainability (Creswell & Plano Clark, 2010; Etikan, 2016). Maximum variation sampling, a type of purposeful sampling, was applied. A broad spectrum of interviewees were selected in order to have a wide range of experiences and perspectives of the phenomenon (Etikan, 2016). 17 interviewees were identified. With this case being a single company, care was taken to select participants with a wide range of perspectives on sustainability, which was increased by varying the functional areas, gender, age, tenure and level of seniority of the interviewees. Of the 17 interviewees selected, 3 candidates withdrew - 1 due to insufficient time and 2 due to lack of interest.

Interviewees were invited by the organisational sponsor who provided organisational context for the research and introduced the researcher. An informed consent form was supplied together with information on the research, interview, and dashboard displays of the quantitative findings.

A total of 14 narrative interviews were completed for Case B in February 2018. 13 interviews were with employees and 1 with a consultant. 10 interviewees (71%) were based in head offices with four interviewees (29%) in the branch network. One interview was discarded due to poor data quality. Interviews were mostly conducted on voice-over-internet protocol (VOIP), and some over Zoom, a web conferencing application. The choice of format was determined by the bandwidth and availability of technology. Both formats allowed for good quality digital recordings of interviews.

The demographic profile of the sample for this case is displayed in Figures 5.38 – 5.41. Whilst demographic criteria for diversity were applied, the researcher was particularly interested in achieving the maximum variety of views on sustainability.

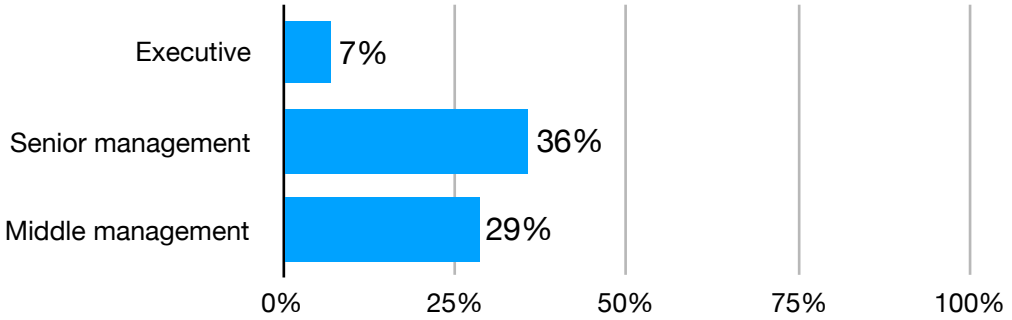

Figure 5.38: Sample management levels

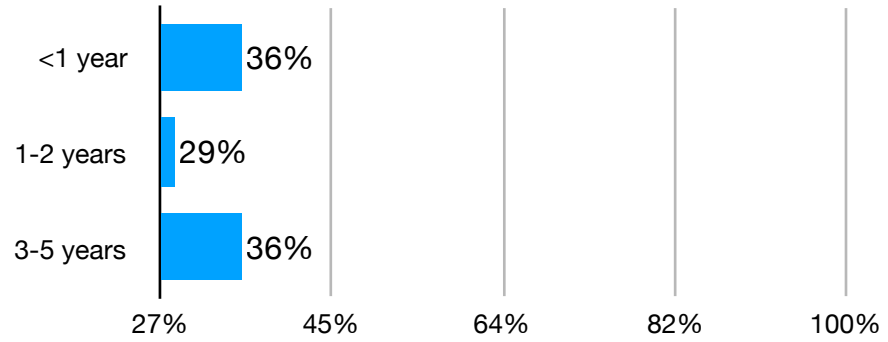

Figure 5.39: Sample tenure

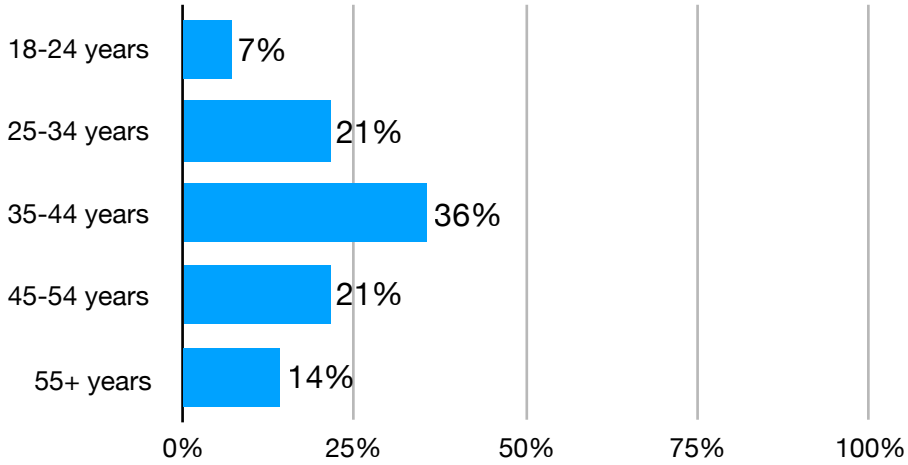

Figure 5.40: Sample age categories

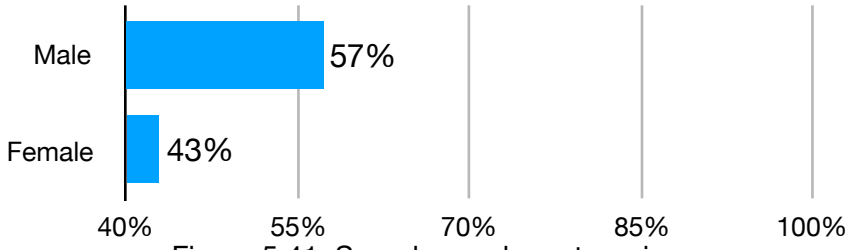

Figure 5.41: Sample gender categories

Whilst 71% of the sample came from head office, there was a wide range of functional disciplines represented at head office. The researcher was satisfied that saturation had been achieved with this sample and a wide range of perspectives included.

5.4.2 Transcription and data analysis

Each interview was transcribed verbatim and uploaded onto Dedoose for analysis. Demographic fields were linked to the transcripts on Dedoose, which enhanced flexibility in the process of data analysis. Codes were created to analyse embedded sustainability, embodied sustainability and conditions that enabled emergence of sustainability; the Hermeneutic circle approach was used.

5.4.3 Axiological development domain

This section reports on the qualitative results for the interior-collective integral domain (Wilber, 2001), which is the values domain of Cassandra. As with Case A, this domain has been named "axiological development" to emphasise values as an ongoing process of establishing and re-establishing a sense of what constitutes value in the context of the organisation. This section addresses both the dimensions of coherence and the conditions that enable emergence for the domain.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. The first level was labelled embedded coherence, which refers to coherence between the firm and the systems in which it is embedded. The second is embodied coherence, in which sustainability emerges through embodiment at level of agent in the system. Coherence at this level encourages self-organisation and emergence. The dimension of axiological signification was found to operate at an embedded level and the dimension of axiological resonance at the embodied level. Both dimensions are displayed in Table 5.5.

Level	Label	Definition
Embedded dimension	**Axiological signification**	The extent to which co-evolutionary axiological direction is compelling to stakeholders.

Embodied dimension	**Axiological resonance**	The extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent.

Table 5.5: Axiological dimensions

The dimension of **axiological signification** describes the extent to which the direction of axiological development is compelling to stakeholders. This dimension describes coherence at the embedded level of system, thereby considering ways in which the firm co-evolves within its containing system. At the embedded level, signification provides a direction for ongoing axiological development as the organisation co-evolves with its containing system.

Many interviewees expressed enthusiasm for the brand positioning of "money experts who do good". This axiological signification offered a broad ethical positioning, whilst providing an open role signifier ("money experts") that has the potential to facilitate novel interpretations. The signifier thus creates a useful interpretive frame. An executive described the value of this process of collective interpretation:

> "With the brand change last year, there was definitely again a heightened awareness around what it means to do good. Internal brand essence would say that we are 'money experts'; we can clearly grapple and understand what does this 'doing good' mean. That has given us a chance to say, hold on, we are changing our whole brand and culture, really looking at who we are as a bank. We might also want to look at our corporate social investment and sustainability strategy and formalise the doing good part" (BN13).

Communicating purpose was perceived as fundamentally important in axiological signification. Furthermore, communications around purpose in axiological signification are seen in this case to be two-way, enabling axiological resonance which is discussed in the next section:

> "As I said, if you understand the 'why' and what the outcome will be, at the end of the day it filters down into profits and profit margins. If staff don't buy into it, they don't understand it, they don't understand the concepts of why we're doing things, I think the buy-in goes right out the door. Communication I think both ways is very important" (BN10).

The dimension of **axiological resonance** describes the extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent. When embodied there is resonance - axiology is experienced as a *felt sense*, a bodily experience of the complex system (Gendlin, 1996). Falling within the values domain of Cassandra, this is the embodiment of a collective-interior attribute of the organisation.

The axiological signification by the institution, which is well known both in the market and amongst employees, was identified by an interviewee as a reason for applying for a job at the organisation. Several interviewees spoke about the different needs of employees from the millennial generation, and an interviewee commented:

> "When I started at (organisation) in 2015 - what actually attracted me to the green bank was how the green word actually bodes - and how the 'green work' around (bank) builds us together as employees - initially what attracted me to (bank) was the values - the values actually speak to my personal values" (BN3).

The axiological signification was reported by employees to be important to them personally. Notice the emotive language used by an employee in the branch network, indicating a personal sense of axiological resonance:

> "It is a very 'catchy' phrase (money experts who do good). I love it. It's in line with our strategies and objectives. However, we have yet to live up to it" (BN5).

Whilst there was a strong sense of axiological resonance across interviewees, with some being very passionate about the notion of "money experts who do good", there was also a sense from several interviewees of this being undermined by what is perceived as a fear-based management style. A manager in the branch network said:

> "I think the bank is going to move on like they do because we are doing good. Maybe they should just take the focus off a little bit of the fear management that they are doing now" (BN14).

The perception or experience of being managed by fear negates the good work in axiological signification. A senior manager at the head office had similar concerns:

> "In terms of sustainability, I think we've still got a far way to go. We haven't managed to cover a lot of ground on that…If you take a company and you push it to the limit, the people, is that sustainable? Not really…It's more of a current survival mode in the current economic climate. It's been trying to really position (bank) and that takes a non-sustainable management style to get it back on track. So, sustainability, I can't really say that (bank) has managed well. I don't think so" (BN2).

For axiological resonance to be maintained, the ethos associated with the axiological signification needs to be embodied at senior levels. When this happens, a coherent ethos is more likely to emerge.

Condition and mode of emergence

This section discusses the axiological condition that enables the emergence of sustainability, and then goes on to consider the axiological modes by which sustainability is enacted. Both the condition and mode refer to the axiological enactment of sustainability and are displayed in Table 5.6.

Level	Label	Definition
Enactment condition	**Axiological frame**	An axiological frame is a shared perceptual lens which constitutes what is perceived as valuable.
Mode of enactment	**Axiological coalition**	A coalition of agents who enact sustainability via the activation of a shared axiological frame.

Table 5.6: Axiological enactment

The presence of an **axiological frame** as an enacted condition of coherence allows for an axiological coalition of agents to enact sustainability through a shared perceptual lens which constitutes what is deemed valuable. The axiological frame was positioned in a holistic manner, considering the employees at work and in their personal lives. An executive described this in a way which embraced each integral quadrant (Wilber, 2001), namely the individual-interior ('moral obligation'), individual-exterior (behaviour), collective-interior (culture) and collective-exterior (work environment). The axiological frame thus has the potential to address all integral quadrants, and address the organisation holistically:

> "We see it as a moral obligation, and with that there is a chance, also, to change our culture. Become more sustainability - the behaviours of employees -making sure they have sustainable behaviours, both at work and at home. So there is really a chance to plan for the doing good part, being green and moving into a new building. I know moving into a new building is just symbolic of sustainability but at least it's something very tangible, it's an event that you can celebrate and plan around. And living in a green building will mean that we will be forced into different behaviours" (BN13).

Whilst the axiological frame for many years has been associated with green initiatives, an executive described how this is now shifting towards a more holistic approach, which could be described as a wider axiological frame:

> "Whilst we call ourselves the green bank, and part of our deep green aspirations, to be a green and caring bank, but we've not been a green bank. We supported conservation efforts and programmes, well deserved programmes, and eminent programmes at that, and projects and initiatives that progress the sustainability side of looking after our environment, you know, it's probably not been as big a priority focus for us, throughout the 10 years that I've been here. But that has started to change, particularly becoming more pronounced as we moved into the 'money experts that do good' part. To say, you know, we can be money experts, but what do we do in terms of doing good for the entire community in which we operate. What is our impact, holistically, on a global level? That does bring, I think, a really strong focus to sustainability" (BN1).

The widened axiological frame can be seen as a very positive development in that it repositions sustainability holistically as core to the business, as opposed to a set of initiatives that are bolted onto the business. This positioning opens up sustainability as relevant to everyone in the business, and acts as a condition to support the enactment of sustainability.

A manager commented that this is currently more about brand repositioning than integrated with sustainability:

> "The 'money experts who do good' is not necessarily from a sustainable perspective. That was just a brand change. So right now it's still on the outside and not really on the inside. It's more brand change and not necessarily integrated sustainability" (BN8).

This suggests that whilst a widened axiological frame holds substantial potential for mainstreaming sustainability in the business, it also runs the risk of insufficient links being made with sustainability, thereby inhibiting the enactment of sustainability.

Axiological coalitions were identified as the mode through which the axiological domain of sustainability was enacted. This is a coalition of agents who enact sustainability through collaboratively activating a shared axiological frame. This mode was recognised to some extent by interviewees by its absence. Whilst a good axiological foundation has been set, more work needs to be done for this to be enacted. One executive put it this way:

> "We would want to shout from the rooftops that we are an environmentally conscious bank, that we support certain causes, but our own lifestyles do not mirror that, and our way of operating does not mirror that. We are just really paying lip service, and your personal integrity as well as the professional integrity of the bank comes under scrutiny. So I think it has to be principle-, and not cost-driven. You know, when it's principle-driven, and you get it right, and everybody lives it, by extension, the costs will be curbed, by living sustainably as it were" (BN1).

The notion of being "principle-driven" is fundamental to axiological coalitions as a mode of enacting sustainability. In this quote the executive referred to himself and his team ensuring that corporate communication was delivered with integrity. There is a recognition of both the value of current corporate sustainability activities and of how much further the bank needs to go. The lack of coherence in the complexity axis, and for several clusters in the diversity axis, could be seen to reflect the limited evidence of axiological coalitions.

The effectiveness of the recent axiological signification offers substantial potential for enactment through axiological coalitions. This potential remains largely untapped.

5.4.4 Semiotic development domain

This section reports on the qualitative results for the individual-interior integral domain (Wilber, 2001), which is the personal development domain of Cassandra. The personal development domain has been repositioned as semiotic development since the essence of personal development was found to be associated with shifting the perception of what is considered personally meaningful to agents. This domain addresses interior-individual aspects of organisations, namely the personal development of agents in the system. This section covers both the dimensions of coherence and the conditions that enable emergence for this domain.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. Semiotic symbiosis was the dimension identified at the embedded level, and semiotic embodiment was identified as a dimension operating at the embodied level. Both dimensions are displayed in Table 5.7.

Level	Label	Definition
Embedded dimension	**Semiotic symbiosis**	The extent to which what is considered as personally meaningful is enriched by symbiotic interaction with the containing system.
Embodied dimension	**Semiotic embodiment**	The extent to which sustainability is personally meaningful and implicit.

Table 5.7: Semiotic dimensions

The dimension of **semiotic symbiosis** describes the extent to which what is considered as personally meaningful is enriched by symbiotic interaction with the containing system, whereby a "persistent mutualism" is developed (Douglas, 2010, p. 6). There was recognition of the importance of semiotic symbiosis and the potential value of stakeholder engagement in moving towards co-evolutionary practices. A senior manager at head office perceived this to be a way to support initiative:

> "We want to help you (employees) better understand the impact of your specific lifestyle - impact on our ecosystems – and how lifestyle change can happen. I think if

> employees could get a grip of that or understand that, then they would be more involved and not only that but we would take this out there to the public…and our employees would take whatever initiative that they're trying to come up with here to support the environment, then they would take it out there so it becomes easier for the bank to try incorporate social responsibility or social issues" (BN3).

A branch manager spoke of work her branch was doing in townships to bridge the gap between the community and banking services and products. Whilst the emphasis is on education as part of marketing initiatives, this kind of activity enhances semiotic symbiosis by providing an experience of how needs in the containing system are, or can be, supported by the business:

> "We have a lot of people out in the rural areas that don't have access to banking at all. They don't have the access of knowing how to work with money, how to work with an ATM card or how life outside is working. I think it's important that we actually get out there to educate those people…Even someone in the rural area is supposed to be able to do a transaction on a smartphone, or having a banking account and watching his money grow - that's a money expert that does good" (BN14).

This dimension was thus recognised with some evidence of activities and interactions with the containing system which support semiotic symbiosis. However, it should be considered more aspirational than fully formed.

The dimension of **semiotic embodiment** describes the extent to which sustainability is personally meaningful and implicit. That which is considered as meaningful becomes embodied in the organism through ongoing habits and practices that enable a performative capacity to be developed. One aspect of semiotic embodiment that came through in the interviews was a sense of belonging and pride in working for the bank. The metaphor of family, which communicates an embodied sense of belonging, was used. In the words of a branch manager:

> "I feel that the way we are still a family in (bank), especially at branch level…you are actually still like a family and that family feeling gives you comfort" (BN14).

A similar theme came through at head office, where interviewees also spoke of a sense of pride and belonging:

> "It's always ironic to walk down the corridor and then you see an old colleague: 'Oh, you're back!' (Bank) is a wonderful place to work for and, like I said, a lot of people leave and come back" (BN15).

Several interviewees spoke of the advantages of the organisation in Namibia being small - there was still an opportunity to respond to the individual needs of customers. A sense of ethos thus came through strongly in the descriptions and was in part linked to the journey of building a "green bank". Whilst this historically pertained to corporate social investment, it has remained semiotically embodied. The ethos is reflected in the aspiration to embody sustainability in an authentic manner, as expressed by an executive:

> "If we are going to be a green and caring bank, then we have to be driven to be so, not because of cost or image, but because it really and truly lies at the heart of things that we strongly believe in" (BN1).

One interviewee based at head office saw a potential risk of what he referred to as "moral licencing" associated with the bank's legacy as a "green" bank: "if there is a perception that we are green - on our broader scale, it may lead to people thinking - okay, we've done our bit and we don't really have to do anything" (BN7).

There was a recognition that it was more useful to raise awareness than to attempt to convince agents in the system to support sustainability initiatives. It is interesting that the awareness is linked to both a holistic appreciation for sustainability ("sum of its parts") and different temporal perspectives. An executive described it as follows:

> "So advocacy is something that we should be doing. But it's one thing preaching something to people that you just cannot convert. So I'd say rather than advocacy, it's probably a question of raising the awareness, and making people fully understand what sustainability means, in all of the sum of its parts. But what that impact is, not only now, but what could be in a number of years if we go down this particular rabbit hole, and if we dig ourselves out of the rabbit hole and see the future for what it can be" (BN1).

Semiotic embodiment is challenging as it calls for holistic awareness of sustainability and for agents to anticipate longer term impacts, which cannot be directly experienced.

Condition and mode of emergence

This section discusses the semiotic condition that enables the emergence of sustainability, and then goes on to consider the semiotic mode by which sustainability is enacted. Both the condition and mode refer to the semiotic enactment of sustainability and are displayed in Table 5.8.

Level	Label	Definition
Enactment condition	**Semiotic intention**	Semiotic intention is the extent to which active engagement in sustainability is driven by a sense of personal meaningfulness.
Mode of enactment	**Semiotic refraction**	Semiotic refraction is the process of perceiving a differentiated view of a multiple object using a sign.

Table 5.8: Semiotic enactment

Semiotic intention is a condition of emergence in which agents are driven to engage in sustainability initiatives because of a sense of personal meaningfulness associated with these activities. The importance of semiotic intent was associated with supporting employees to recognise the value of sustainability. One executive expressed this as changing the "hearts and minds":

> "It (sustainability) can't be a mandatory way of doing things. Either you do this or that will happen to you. That won't make people change their hearts and their minds. I think changing hearts and minds comes from making people see the benefits, not only to them but to their children and ultimately to whoever they hold dear, and people will come around" (BN1).

This is the antithesis of the concerns of some interviewees about management by fear which was being experienced in the organisation. It seems that both are present in the organisational system, yet there is an acknowledgement that the enactment of corporate sustainability requires semiotic intent, and that this is to some extent present but largely aspirational.

There was also the perception that currently employees are generally more oriented to short-term priorities, and less inclined to address longer-term sustainability-related endeavours. In the words of an interviewee based at head office:

> "My general perception is that people are concerned about doing their jobs and hitting their targets and if you make a suggestion about sustainability, then they need to see what the benefit is for them to consider, in quite a short-term perspective" (BN7).

Whilst semiotic intention was recognised as important, the climate of fear and tendency to focus on the short term currently inhibit the enactment of sustainability.

Semiotic refraction was identified as the mode through which the semiotic domain of sustainability was enacted**.** Semiotic refraction is when agents have a differentiated view of sustainability, as a multiple object, when perceiving it using a sign.

A moment of semiotic refraction emerged with a senior manager in the branch network having a flash of insight while reviewing the interview guide and quantitative output in preparation for his interview. He began to see sustainability in a more holistic manner:

> "Reading through your bit of background as well - initially when I got it - I was thinking of sustainability as in environment, renewable energy - that sort of sustainability. But I then realised it was much more comprehensive. I think each aspect of the business has to be sustained to make the collective sustainable. It's really looking at drilling down into the different clusters, offerings, whether staff – human resources - and the sustainability around those different divisions and whatever is entailed therein. Essentially at the end of it, the sum total of the whole bank and how we sustain that going forward. It's a whole wide range of things" (BN10).

Semiotic refraction is supported by dialogue between a wide range of diverse interest groups, as represented by the clusters. The coherence in the sustainability axis across all clusters other than the outlying cluster and multiple points of coherence between several of the clusters display common ground amongst diverse perspectives.

There was an example of semiotic refraction from an interviewee in the branch network which shows substantial depth of reflection on what is needed for corporate sustainability to be

enacted. He drew on a family metaphor which illustrates the process of emergence in a complex adaptive system:

> "If you really want change, then you, yourself, have to embody whatever change that you want to implement. An organisation is a living entity in its own right, so treat it like a family, treat it like a human being. If you want change to happen on the external environment, you have to start internally with your own family members, your units abide by the rules and let that go outwardly. Otherwise it will - not all the time, but most often - just be a move made for show, for the sake of promotion. If you truly want to embody it, you have to start looking inwardly" (BN5).

There was a recognition of the value of agents in the system enacting sustainability in small ways. There was a sense that this "inside-out" approach enables sustainability to grow in the organisation. As an employee in the branch network described it:

> "If you want to make a change on the environment around you, the change has to start with you. So I believe the organisation, internally, has to start with the smallest of things. Small things that focuses on sustainability and the impact of the organisation on the environment. Focuses on the level of electricity being used within the branches, how renewable is it? Just small steps which will eventually grow, form part of the business strategy and subsequently flows outwardly" (BN5).

This is a way of viewing semiotic refraction. Semiotic refraction enables agents across the system to gain a clearer perspective of sustainability in the business.

5.4.5 Co-evolutionary performance domain

This section reports on the qualitative results for the individual-exterior integral domain (Wilber, 2001), which is the mechanistic performance domain of Cassandra. It should be emphasised that for sustainability to be enacted, mechanistic performance must be repositioned to be co-evolutionary. Whilst mechanistic approaches to management are still relevant to this domain, they are applied towards co-evolutionary performance.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. Co-evolutionary value was the dimension at the embedded level, and co-evolutionary practice was a dimension operating at the embodied level. Both dimensions are displayed in Table 5.9.

Level	Label	Definition
Embedded dimension	**Co-evolutionary value**	The extent to which value is simultaneously created for the organisation, stakeholders and containing system.
Embodied dimension	**Co-evolutionary practice**	The extent to which co-evolutionary activities are embedded in the agent's regular business practices.

Table 5.9: Co-evolutionary dimensions

The dimension of **co-evolutionary value** describes the extent to which value is simultaneously created for the organisation, stakeholders and containing system. The co-evolutionary nature of corporate sustainability was acknowledged by interviewees. In the words of a senior manager at head office:

> "I must say that for me that is - the whole sustainability issue is a lot wider than just a company. You know, (bank) can be highly sustainable, we can have green buildings, we can do a lot of things but if you're sitting here as an island, as a one-man show in the corporate world, you're not going to survive. It takes everybody to move towards that goal" (BN2).

Key to co-evolutionary value, in the case, was the journey with corporate social investment initiatives which, according to a senior manager at head office, was "more about us giving money and not necessarily forming strategic partnerships. Now we're heading towards strategic partnerships" (BN8). This offers greater possibility for value-generation through more in-depth engagement with the containing system:

> "There is a plan to work closer with the (environmental agency) to integrate them into our corporate social responsibility plans as well, like involving them in how we identify projects since they work in communities in different areas" (BN8).

A senior manager at head office argued that discussion around sustainability needs to be linked to financial performance:

> "My major concern is that our financial performance is not where we want it… There must be a link to financial performance and I think there's a culture within the bank: I'm just sitting here, I'm just getting my salary, nothing will happen to me, so there's reluctance within the bank: I don't take any accountability or responsibility for what I'm doing and we have the sullen mentality in some divisions" (BN11).

A point of coherence emerged between clusters 1, 4 and 5 (with a combined weighting of 44%) in the finance axis of the quantitative dataset. This more critical view of the finance axis was associated with a marginally more optimistic view of the sustainability axis for the same clusters.

The dimension of co-evolutionary value was recognised with reference to both the ongoing financial performance of the business and initiatives that support communities and environmental aspects of the containing system.

The dimension of **co-evolutionary practice** describes the extent to which co-evolutionary activities form part of an agent's regular business practices. The importance of co-evolutionary practice was recognised, but generally considered as aspirational within the business. The examples used were limited to foundational practices such as reducing printing and electricity usage. An executive commented:

> "I think we are still falling woefully short of truly living that (sustainability) and making it part of our DNA. We don't separate garbage, recycle, and that sort of thing. If you look at sustainability, the focus has been on saving costs. When you look at less printing, you know, things that have an impact on the environment, making sure you switch your lights off. It was probably cost-driven rather than principle-driven. That's just the sense I got over the past 10 years. That's starting to change" (BN1).

The shifting axiological signification was perceived by interviewees to have implications for the dimension of co-evolutionary practice in focusing on building long-term relationships with clients. According to an interviewee:

> "Last year we had a brand repositioning, so we changed from making things happen to money experts who do good. So it's not only about how to give money and to teach you how to save, but it's like we're building a life-long relationship with you" (BN9).

Another interviewee at head office, however, suggested that broader co-evolutionary practices are not that evident in the business:

> "To be honest, to me it seems quite small scale. I don't really see anything tangible in terms of sustainability, the few initiatives in the business - staff planting trees or something like that - seem very tokenistic. So, I don't really get a sense of any kind of awareness within the operation of sustainability aspects. I get a sense that people are more focused on meeting the traditional matrix and targets which are relatively short-term" (BN7).

Whilst there were divergent views about the levels of awareness, there is a clear sense of co-evolutionary practices being nascent. An executive discussed initiatives that were planned to extend co-evolutionary practices. A new head office is under construction and will be a green-rated building. This was perceived as beneficial for creating a context conducive to the adoption of co-evolutionary practices. The executive provided a holistic view embracing several aspects which are perceived to support the development of co-evolutionary practices:

> "Yes of course people understand the giving part of sustainability, the donations and sponsorships. It's very difficult though, to change behaviours, and to integrate sustainability into your operation. A building like that (referring to the new head office which will be a green building) is one tool, and it's not the only one we are looking at. The other one would be the reporting. So integrated reporting and setting up proper KPIs and all of that. The building gives us an opportunity, and it's not just sustainability. The other thing is the agile. We want to move towards more agile structures and working together. With agile, funnily enough, it's very close to sustainability so working in teams, thinking more team, collaboration, taking care of each other. Working with less of a footprint in terms of your desk space and parking and all of that" (BN13).

There is a good level of awareness of the need to actively build co-evolutionary practices in the company, yet this dimension remains aspirational.

Condition and mode of emergence

This section discusses the co-evolutionary condition that enables the emergence of sustainability, and then goes on to consider the co-evolutionary mode by which sustainability is enacted. Both the condition and mode refer to the co-evolutionary enactment of sustainability; they are displayed in Table 5.10.

Level	Label	Definition
Enactment condition	**Co-evolutionary scope**	Co-evolutionary scope is a condition in which agents have a clear mandate within which to self-organise.
Mode of enactment	**Co-evolutionary self-organisation**	Co-evolutionary self-organisation is the process whereby an agent actively contributes towards co-evolutionary outcomes.

Table 5.10: Co-evolutionary enactment

Co-evolutionary scope is a condition of emergence in which agents have a clear mandate within which to self-organise. Co-evolutionary scope was emphasised by interviewees. An executive acknowledged that it was insufficient to define scope in a top-down manner only:

> "I'm not saying that the company or leadership should define it; it must be defined holistically, and once it is defined holistically, we have got to endear and entrench the concept of sustainability. Then leadership needs to take charge and inspire whatever we need to inspire from a change management perspective" (BN1).

Thus the role of leadership is perceived to involve inspiring agents to contribute to defining and stepping into the co-evolutionary scope. Defining the scope holistically means that it cuts across the silos of the business and is semiotically embodied. The same executive explained the view as follows:

> "It doesn't touch my heart as it would have if I know that the role that I now do contributes to the overall agenda from a sustainability perspective. So that's the sort of line we must be drawing. I've got to understand how my role impacts on the sustainability agenda. Not how my role impacts on an aspect of the sustainability agenda" (BN1).

This is a more emergent view of the co-evolutionary process in the company as complex adaptive system. Interviewees went further to widen the co-evolutionary scope as being about the entire business, rather than positioning it as a set of initiatives:

> "It's not just about being green, it goes even further. You can link sustainability to every single project in the bank. It's typically about the bottom line - the rands and cents - that count and that's how they get measured, get bonuses, get increases. But it's not just that. There are a lot of steps in between. I think communication is crucial" (BN10).

Again there is a recognition that co-evolutionary scope goes beyond performance management and the hierarchical chain of command, to providing a space in which agents can enact sustainability. This view bodes well for the transition to a sustainable future due to the extensive and interdisciplinary nature of this transition. In the words of a senior manager from the branch network:

> "It (sustainability) actually, in my mind, covers every single aspect of your being as a company. You could pull sustainability right through from A to Z. Anything you can mention in business probably has a sustainability issue around it, good or bad. You need to be aware of where are we going with this? Is whatever we're doing sustainable going into the future? You have to ask that question about everything that you do" (BN10).

This view presents a broad co-evolutionary scope requiring conscious attention which brings the importance of axiological resonance and semiotic embodiment into focus. It was complemented by a recognition of the concurrent need to provide clear boundaries and an overall plan, thereby creating a context in which co-evolutionary scope can be defined:

> "A few people right now are working towards that (sustainability). So I suppose when the clear defined plan in terms of how to roll this out - it will be shared with the broader staff members. So it's really in its infancy. It has no structure yet and it's not being rolled out yet, so there's really nothing much you can say about it" (BN8).

The dimension of co-evolutionary scope was addressed by several interviewees in a way that acknowledged the transition to a sustainable future as an emergent process. This dimension was recognised as aspirational.

Co-evolutionary self-organisation was identified as the mode through which the co-evolutionary domain of sustainability was enacted. Co-evolutionary self-organisation is the process whereby an agent actively contributes towards co-evolutionary outcomes. Interviewees emphasised the context of disruption and uncertainty when discussing co-evolutionary self-organisation. An executive proposed that agents could find a way to enact sustainability in difficult times if they viewed sustainability holistically:

> "How do we turn our sails to the winds, the prevailing winds. If profits are under pressure, maybe we're doing well in other areas of our business that can lead the inspirational charge and that can ultimately impact on each area of our business. It has to be holistic. It can't be siloed, because siloed will not give us a complete sense of how well we are doing, or how poorly we are doing" (BN1).

A senior manager emphasised the co-evolutionary nature of the self-organisation. Ultimately, for co-evolutionary value to be created, the needs of multiple stakeholders from the organisation and containing system must be met:

> "It's boiling down to everyone in the world being more climate conscious, going more on the 'green side'. I think that will help (bank) in their focus to 'go green', especially if we drive that and clients have that as part of the structuring of their business, and that will definitely run concurrently with what (bank) wants to do" (BN11).

There was a recognition that the enactment of corporate sustainability through co-evolutionary self-organisation is self-directed, requiring semiotic embodiment and axiological resonance:

> "Like all changes, it starts with one thought. So from the vision to be perfect - being conscious of the environment, we obviously have to start with ourselves…It all has to start internally and flow outward" (BN5).

Building in constraints has supported co-evolutionary self-organisation. An example mentioned by an interviewee at head office was controlling the cost of printing as part of the balanced scorecard which has "forced us to come up with various initiatives" (BN3).

There was, however, a perception that currently sustainability remains cost-driven. As an executive put it:

> "There are staff members of (bank), undoubtedly, who live green lives, but I'm sure that in many of those instances, the input and the driver is saving cost rather than the impact that we can minimize our carbon footprint on the environment so that future generations can still profit from the earth and that we don't destroy it" (BN1).

This leaves room to develop a more holistic approach amongst employees that acknowledges individual-interior and collective-interior integral quadrants.

The quantitative data showed more critical clusters (1, 4 & 5) with relatively high sustainability scores compared with other axes. Whilst an executive perceived the most optimistic cluster (3) as potential "sustainability champions" (BN1), the researcher would argue that co-evolutionary self-organisation may require a critical view of the business and can potentially be supported from all clusters, albeit in different ways. It is likely, however, that interest groups that are able to view the business with a balanced sense of criticality are needed support the co-evolutionary process.

Cluster 5 with a more critical viewpoint and an 11.32% weighting has an interesting demographic profile with relatively higher representation from younger respondents (18-34 years) as well as older respondents (55+ years). An executive commented on the value of having a segmented approach to sustainability:

> "Instead of having a very hierarchical approach to sustainability, that is, having executives and senior managers leading sustainability, looking at the data. It (the quantitative data) makes me think that maybe sustainability needs to be driven by the younger people and those newer to the organisation and maybe more those that sit in branches, those that are closer to the community…These things do seem to make a difference – if I look at your research. You need to have a very segmented approach to sustainability" (BN13).

This view is supportive of encouraging self-organisation as a process of emergence. In this way the diverse outlooks and needs of different generational groups can be accommodated. Co-evolutionary self-organisation is widely recognised by interviewees, several of whom adopted an emergent view of co-evolutionary process. This dimension remains largely aspirational in the business.

5.4.6 Epistemological performance domain

This section reports on the qualitative results for the exterior-collective integral quadrant (Wilber, 2001), which is the systemic performance domain of Cassandra. This domain is named the epistemological performance domain and is focused on knowledge supporting co-evolution with the containing system.

Dimensions of coherence

Coherence was found to operate at two levels, which together created conditions in which sustainability was enacted in the firm. Epistemological range was the dimension identified at the embedded level, and epistemological network density was identified as a dimension operating at the embodied level. Both dimensions are displayed in Table 5.11.

Level	Label	Definition
Embedded dimension	**Epistemological range**	The extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded.
Embodied dimension	**Epistemological network density**	The extent to which the epistemological network has rich interconnections.

Table 5.11: Epistemological dimensions

The dimension of **epistemological range** describes the extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded. Ontological pluralism, which is associated with the transition to sustainability, requires multiple methodologies (Esbjörn-Hargens, 2010) and thus a wide epistemological range to enable effective co-evolution with the containing system. There was recognition that sustainability was connected to all aspects of the business. As an executive described it:

> "These things do not work in isolation. If we want to be sustainable, we cannot just look at sustainability. It needs to incorporate all the other elements as well. Even if we fix leadership, we will still not be sustainability, we will need to look at diversity and complexity. They are all integrated" (BN13).

The epistemological range is contingent on the way in which a business considers sustainability. The same executive described the importance of having a strategic focus: "sustainability starts with a clearly defined goal – what does it mean to do good in our context" (BN13). This then helps to define the epistemological relevance and range. The epistemological range is best considered concurrently in the holding company and subsidiary businesses:

> "I always think we are part of bigger Group, and don't have to reinvent the wheel, although Namibia has a local context. The (sustainability) framework is something we are looking at and we can definitely adopt. The biggest issue is creating the capacity locally to drive sustainability, which we haven't done yet" (BN13).

There was not yet evidence of identification and tracking of material issues relating to sustainability, and limited evidence of tracking of relevant metrics and data within the organisation and containing system relating to sustainability.

There are obvious advantages to being part of a larger international group, whether it be adapting sustainability frameworks or implementing products and services developed at the holding company. An interviewee at head office commented:

> "coming up with a brand-new idea here as to how it will work is very difficult, so it's very much easier for them (the Namibian entity) to duplicate stuff than starting something from scratch, and that's one thing we do not get – the innovation side" (BN9).

This is likely to reduce the epistemological range since there is less focus on the local context (BN9) and developing ideas in the local market. This is likely to also reduce reciprocal epistemological interconnections between Namibia and the holding company in South Africa.

The dimension of **epistemological network density** describes the extent to which knowledge is networked with rich interconnection between elements. The network density is reduced by a lack of focus on the development of locally relevant ideas that feed into localised business products, services and practices. An interviewee from the branch network commented on this:

> "The very fact that we, as an organisation, do not have an innovation section just completely dedicated to innovation, whereby somebody can come in and throw an idea in and leave it with a group of people and continue with your workload - with your day

> to day tasks - knowing that the idea you left there is being tested. The fact that we don't have such a section or a team in place, shows that we are a long way from innovation" (BN5).

Epistemological network thus benefits from concurrent localised as well as centralised epistemological development, which then encourage, and benefit from, reciprocity. Similarly, an executive noticed how there was a tendency to focus on head office to the exclusion of the branch network. This is a similar pattern at a different level of system:

> "We focus a lot of our efforts involving head office and promoting head office people. We often leave out the branches, they are always left out" (BN13).

Extending initiatives to the branch network would allow for the business to harness local knowledge to develop solutions. Epistemological network interconnections can also be increased through agents considering sustainability beyond a role-based focus. As an executive described it:

> "So my understanding of sustainability; I may understand given the function and discipline that I work in. So I can define sustainability within my role that I'm performing, but can I define sustainability within another role? Unless I can make that picture and I can tie the golden thread, and all of its ends together, would I live sustainability as a principle, or just as a principle within my specific job?" (BN1).

The epistemological complexity that arises from a wide epistemological range and interaction between multiple stakeholders can benefit from formalisation in knowledge management or systems of organisational learning. Whilst the absence of a local innovation capability was noted, there was no mention of systems to support the smart organisation of knowledge.

Condition and mode of emergence

This section discusses the epistemological condition that enables the emergence of sustainability, and then goes on to consider the epistemological mode by which sustainability is enacted. Both the condition and mode refer to the epistemological enactment of sustainability; they are displayed in Table 5.12.

Level	Label	Definition
Enactment condition	**Epistemological contact**	The extent to which relevant data needed for co-evolution is accessible to agents.
Mode of enactment	**Epistemological extension**	The process whereby knowledge of co-evolution is extended through the enaction of sustainability.

Table 5.12: Epistemological enactment

Epistemological contact is a condition of emergence where relevant data needed for co-evolution is accessible to agents. There was recognition of the importance of epistemological contact, where a reduction in epistemological distance enables agents to grasp the urgency of sustainability. An executive pointed out that disruption and instability in markets intensified the need for epistemological contact:

> "When people really get how urgent it is actually to become a more sustainable organisation….in all change, there needs to be a sense of urgency. It might also come with other challenges, market disruption…for example if the market's disrupted, maybe the profit margins shrink, there is not budget to do (sustainability initiatives), or there is a reprioritising, because it can probably pull both ways?" (BN13).

There was concern amongst some interviewees that the quantitative data gave a more optimistic view of sustainability in the business than was actually the case. This perception, if correct, would act to further increase epistemological distance as agents are reluctant to engage critically about pertinent issues facing the business. As one senior manager expressed it:

> "There's a bit of a skewed view on what they think sustainability is about (referring to the clusters in the quantitative dataset), the understanding of sustainability and…even if it's a contradiction - people won't be honest" (BN2).

Epistemological contact with a complex and multifaceted phenomenon such as sustainability can be challenging to grasp. An executive put forward an optimistic view of human nature, recommending a measure of supportiveness to assist agents to make sense of relevant data:

> "In general, people are good natured at heart. I don't think people want to do things wilfully. Maybe they just don't understand. The only condition I would see is that one that we guide and where we need to prod, we prod. We guide, lead and inspire. And that's the only condition, I think, that will make people galvanise behind a sustainability cause" (BN1).

Epistemological contact was acknowledged as an important condition for the enactment of corporate sustainability. There were concerns that the current view might be a bit skewed, but that epistemological contact with the necessary support was likely to encourage a co-evolutionary response from agents.

Epistemological extension was identified as the mode through which the epistemological domain of sustainability was enacted. Epistemological extension is the extent to which knowledge of co-evolution is expanded through the enaction of sustainability. An interviewee in the branch network was concerned that an overestimation of the current performance of the bank with respect to sustainability (clusters 2 & 3 with a combined weighting of 54%) and other indicators might inhibit epistemological extension:

> "If everybody is happy with the way things are currently being run (referring to the optimistic clusters in the quantitative data), then how would we improve? That means our goals and targets are not big enough, our resources are not being fully utilised and so forth" (BN5).

As the business environment becomes more uncertain and dynamic, and the co-evolutionary performance becomes more challenging, there is an increased risk of communicating in a way that creates a limbic system response. Stress responses reduce activation in the prefrontal cortex (Rock, 2009), thereby reducing the capacity for epistemological extension. As a senior manager described it:

> "The one mistake we do from a communications perspective, is that we set ourselves financial targets, and you fall short of those targets, and the message is one of doom and gloom. Because I think that is how we want to inspire better performance, by painting that picture of doom and gloom. I don't know if that always is the right way of inspiring people to do better" (BN1).

It is useful to examine the interplay in epistemological extension across both the holding company in South Africa and the subsidiary in Namibia. The business in South Africa has gained international recognition for sustainability practices (Mosher & Smith, 2015). A senior manager in the branch network spoke about the focus on renewable energy in the South Africa business:

> "If you ask me what we do differently to other banks, apart from the branding, the advertising and the lip service - I think in South Africa more - I know that our renewable energy side in South Africa was really good, until it got switched off by government to some extent. But it's now sort of back on track, or so it looks like at the bank…In Namibia it's so much smaller, you don't have these billion megawatt-type projects - it doesn't exist. It's very much on a smaller scale" (BN10).

To leverage on this experience and expertise, appropriate linkages are needed. The same interviewee spoke about how inadequate linkages had inhibited epistemological extension in the Namibia business:

> "And I must say, I think we've missed a lot of that initial emphasis because of our linkage not being set up appropriately. You can have the specialists in South Africa; I talk to them regularly but when it comes to do due diligence. The question is: who does it? Do we get somebody from South Africa to fly in? It becomes expensive and sometimes the project doesn't warrant (the cost), so we have those sort of constraints. There's a lot of rooftop solar-type projects on the go at the moment in Namibia. I mean one thing they do have is sun, so it makes sense. But Namibia still gets about 66% of its energy from South Africa" (BN10).

It is useful to consider energy, like many other environmental issues, as both a regional and a national concern. This positions multinational financial institutions to contribute to issues that stretch beyond national boundaries. The missed opportunity identified here highlights the

importance of building local expertise in order to support epistemological extension across the group.

Interviewees spoke of the opportunity for epistemological extension through corporate social responsibility activities that encourage teamwork and engagement. The initiative described by an employee at head office as a “beautiful journey” offered the opportunity for epistemological extension and semiotic embodiment:

> “What we learned from the 90-Day Challenge - the whole thing was actually how we can make use of the resources that are available to us in an acceptable manner. We also, as teams, had go out and plant trees in the community…We also have people who are assigned to that within each department that goes and makes sure that tree has been receiving enough water and everything is fine, wherever we went to go plant it” (BN3).

It is interesting that the initiative was designed to simultaneously foster teamwork and environmental awareness, which provides a potentially valuable direction for mainstreaming sustainability in organisational development initiatives.

Corporate social investment offers an important avenue for epistemological extension, which involves interaction with the containing system in corporate social investment initiatives whereby the business builds partnerships “to share our expertise, not only just to invest money into specific projects…I think that is something which has been lacking and there’s not enough awareness as to what the bank is really doing when it comes to our sustainability” (BN3).

Epistemological extension, as a mode of enactment of sustainability, can thus be seen in a holistic manner, where knowledge pertaining to sustainability is extended through experiences that bring together sustainability and business in interaction with the containing system.

5.4.7 Conclusion

This section presented the findings of the qualitative data for Case B. The emergence of sustainability was seen to be enacted through four modes. Four conditions were found to underpin the enaction of corporate sustainability. Coherence was found to operate at both embedded and embodied levels, and four dimensions were identified at each level. Modes, conditions and dimensions included all integral quadrants. Axiological signification and axiological resonance were well-developed in this case, and there was evidence of a strong ethos of sustainability, which may to some extent filter down from the holding company in South Africa, which has made substantial progress in sustainability. This is, for the most part, not yet properly enacted in the business, as can be seen in the nascent modes and conditions of enacted corporate sustainability. The next section will synthesise the quantitative and qualitative data.

5.5 Synthesis of case findings

This section uses the qualitative data to interpret the quantitative findings for Case B and seeks to synthesise the datasets to identify key assertions for each research question. In an explanatory sequential mixed method design, the emphasis is on using the qualitative data to explain the quantitative results by drawing inferences. The first research question focuses on the clusters, and the second on the levels of coherence. The third research question considers both aspects.

5.5.1 Emergence of corporate sustainability

This section addresses the first research question with respect to Case B, namely, *how does sustainability emerge in financial institutions?* Corporate sustainability emerged through the interaction of six clusters. A summary of the cluster functioning and weights is presented in Table 5.13. The level of influence of each cluster is indicated; this was determined using the qualitative data. The clusters are marked in green if they are developed or well-developed, amber if they are either over-developed or under-developed, and red if they are nascent.

Cluster	Function in system	Rating pattern	Cluster weights	Level of influence
Praise singers	Supports unity of the whole	Very optimistic, very low levels of differentiation	10.69%	Developed
Guardians	Supports and maintains the status quo	Optimistic, very low levels of differentiation	43.40%	Well-developed
Pivots	Brings together diverse interest groups	Variable level of optimism, moderate levels of differentiation	13.84%	Developed
Devil's advocate	Enhances the mainstream through criticality	Moderately critical view, with subtle differentiation	18.87%	Well-developed
The resistance	Influences by highlighting current and future concerns	Critical and differentiated	11.32%	Under-developed
The rebels	Personally invested in leadership and system perturbance	Very critical with moderate levels of differentiation	1.89%	Nascent

Table 5.13: Case B cluster summary

Six clusters were identified in the data, and the clusters were reflected on in the interviews. Case B displayed a balance between optimistic and critical clusters. The praise singers and guardians have a combined weighting of 54.09%, providing a good stabilising influence on the

organisation. Whilst there was evidence of a long history of corporate social responsibility initiatives, and a resonance with the positioning of the bank which was strongly associated with sustainability, most interviewees acknowledged that the Namibian entity was far behind the progress that had been made in corporate sustainability in the South African entity. Many interviewees thus interpreted these ratings as reflecting a lack of awareness of the extent of the transition to a more sustainable future.

The pivots cluster, with a weighting of 13.84%, is capable of bringing together diverse interest groups due to the moderate level of differentiation between axis ratings. Finance and innovation are of concern but join with the more optimistic clusters with respect to sustainability, wellbeing and diversity.

The moderately critical clusters (devil's advocate and the resistance) combined account for 30.19% of the population; they have the potential to exert a substantial level of influence. Both clusters regard sustainability and finance as relative strengths of the business while admitting that there is a long road ahead. Thus even the critics recognise the progress of the business in these areas. The resistance cluster is less satisfied than the devil's advocate cluster with the axes in both interior integral quadrants (diversity, complexity, wellbeing, leadership).

The rebels cluster was an outlying cluster with a weighting of only 1.89%. Most interviewees regarded these ratings as overly critical, but there was a concern that leadership was using fear to drive results.

To understand how corporate sustainability emerges, it is important to consider how agents enact corporate sustainability. Four modes of enactment were identified in the interview data. The modes describe the means by which agents, from any cluster, enact corporate sustainability. Table 5.14 displays the modes and definitions. Where the mode was recognised by interviewees and examples of enaction of the mode were supplied, the mode is marked in green. Where the mode was recognised and there was limited evidence of enactment the mode it is marked in amber, and where the mode was recognised but not yet enacted it is marked in red.

Modes	Definition	Case B (subsidiary)
Axiological coalition	A coalition of agents who enact sustainability via the activation of a shared axiological frame.	Recognised but largely absent
Semiotic refraction	Perceiving a differentiated view of a multiple object using a sign.	Recognised and nascent enaction
Co-evolutionary self-organisation	An agent actively contributes towards co-evolutionary outcomes.	Recognised with some enaction
Epistemological extension	Knowledge of co-evolution is extended through the enaction of sustainability.	Recognised and nascent enaction

Table 5.14: Case B enacted modes summary

The enactment of the modes of corporate sustainability is mostly nascent in Case B. There is some evidence of semiotic refraction. There was recognition that the embodiment of sustainability was important for sustainability to be lived by agents both in the workplace and in their private lives. There was limited evidence of co-evolutionary self-organisation, despite the larger representation of more critical clusters, whose respondents were more likely to perceive the extensiveness of the transition to a more sustainable future, in the quantitative dataset.

Epistemological extension is still nascent and is inhibited by inadequate linkages between the South African and Namibian entities. Interviewees commented on the need for more sustainability expertise on the ground in Namibia or more efficient processes to link with experts in South Africa. The modes of enactment of corporate sustainability are largely nascent but the cluster profiles are well positioned to shift this swiftly, as there is a good balance between optimistic and critical clusters.

5.5.2 Role of coherence in corporate sustainability

This section answers the second research question with respect to Case B, namely, *what is the role of coherence in the emergence of sustainability*? Coherence can be seen as the co-evolution of the integral quadrants (Edwards, 2010). Figure 5.15 shows the levels of coherence within each axis.

Cassandra Axis	Integral quadrant	Case B (subsidiary)
Diversity	Lower left	Moderate coherence across three clusters
Complexity		Decoherent
Personal wellbeing	Upper left	Coherent across two clusters
Leadership and teamwork		Decoherent
Financial performance	Upper right	Coherence across three clusters, moderate coherence amongst five clusters
Innovation potential		Coherent in two clusters, decoherent in remaining clusters
Sustainable development and social responsibility	Lower right	Coherent across five clusters
Knowledge and learning		Moderate coherence across two clusters

Table 5.15: Zones of coherence in Case B

Two zones of coherence were identified in Case B. The sustainability axis was the most coherent, followed by finance which was coherent across three clusters. This confirmed Putnik's (2009) observation that organisations tend to emphasise exterior integral quadrants. The decoherence in the leadership axis was of concern to several interviewees as the

approach used fear to drive results which potentially could be associated with decoherence in the complexity axis.

Understanding the role of coherence in the emergence of sustainability was extended through the interview data where four dimensions of coherence were identified at both the embedded and embodied levels of corporate sustainability. Figure 5.16 displays a summary of the embedded dimensions and Figure 5.17 displays a summary of the embodied dimensions for this case. Dimensions which are recognised and embedded or embodied are indicated in green, whilst dimensions that are recognised but only partially embedded or embodied are marked in amber. Where dimensions are recognised but not embedded or embodied, they are marked in red.

Embedded dimensions	**Definition**	**Case B (subsidiary)**
Axiological signification	The extent to which co-evolutionary axiological direction is compelling to stakeholders.	Recognised and embedded
Semiotic symbiosis	The extent to which what is considered personally meaningful is enriched by symbiotic interaction with the containing system.	Recognised and embedment is nascent
Co-evolutionary value	The extent to which value is simultaneously created for the organisation, stakeholders and containing system.	Recognised and partially embedded
Epistemological range	The extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded.	Recognised but lack of embedment

Table 5.16: Case B embedded dimensions summary

The high level of coherence in the sustainability axis can be partially explained by the strong axiological signification. There is increased focus on semiotic symbiosis, but this dimension is still nascent, and there is a clear recognition of the need for a holistic approach. Co-evolutionary value was explicitly linked to both sustainability and finance, and partially

embedded, which somewhat explains coherence across both axes. Epistemological range seems to be well-developed in the group but not in the Namibian subsidiary, which to some extent explains the only partially coherent knowledge axis.

The embodied dimensions, presented in Table 5.17, are slightly less developed than the embedded dimensions. These dimensions are important for corporate sustainability to be embodied at the level of agent.

Embodied dimensions	Definition	Case B (subsidiary)
Axiological resonance	The extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent.	Recognised and embodied
Semiotic embodiment	The extent to which sustainability is personally meaningful and implicit.	Recognised and partial embodiment
Co-evolutionary practice	The extent to which co-evolutionary activities are embedded in the agents' regular business practices.	Recognised but lack of embodiment
Epistemological network density	The extent to which the epistemological network has rich interconnections.	Recognised but lack of embodiment

Table 5.17: Case B embodied dimensions summary

There is evidence of axiological resonance being embodied; this seems to have been developed over many years, which to some extent explains coherence in the sustainability axis. The continuation of axiological resonance, however, is being undermined by a fear-based leadership approach. This decoherence in the leadership axis can spread to many other areas of the business. There is evidence of partial semiotic embodiment, which was holistically framed. Co-evolutionary practice was well recognised but remained aspirational. Epistemological density could be enriched by a decentralised approach with more focus on the local context, which explains partial coherence in the knowledge axis. The embodied

dimensions are crucial to self-organisation of agents in the system. As corporate sustainability is enacted, the embodied dimensions will be strengthened through application.

5.5.3 Conditions of corporate sustainability

This section addresses the third research question with respect to Case B, namely, *what conditions enable the emergence of sustainability*? The conditions of enacted sustainability are displayed in Figure 5.18. Conditions which are recognised and present are indicated in green, whilst conditions that are recognised and only partially present are marked in amber. Where conditions are recognised but not present, they are marked in red.

Conditions	Definition	Case B (subsidiary)
Axiological frame	An axiological frame is a shared perceptual lens which constitutes what is perceived as valuable.	Recognised and nascent
Semiotic intention	Semiotic intention is the extent to which active engagement in sustainability is driven by a sense of personal meaningfulness.	Recognised and nascent
Co-evolutionary scope	Co-evolutionary scope is a condition in which agents have a clear mandate within which to self-organise.	Recognised but not yet present
Epistemological contact	Epistemological contact is the extent to which relevant data needed for co-evolution is accessible to agents.	Recognised and nascent

Table 5.18: Case B enacted conditions summary

The conditions are mostly nascent, except for the co-evolutionary scope; interviewees commented on the need to broaden the co-evolutionary scope holistically to encourage the enactment of sustainability. The conditions relate to both the cluster profiles and the levels of coherence in the quantitative data. Moderate levels of coherence in the axes across the upper

and lower left integral quadrants can be partially explained by the conditions being mostly nascent. Lack of epistemological contact may partially explain the high sustainability ratings, as some interviewees perceived these to be overly optimistic. Co-evolutionary scope is required for corporate sustainability to be enacted.

5.5.4 Conclusion

This chapter presented the quantitative and qualitative findings for Case B. The substantial progress that had been made by the holding company seems to have brought sustainability firmly into the ethos of the Namibian subsidiary. There was a good balance between optimistic and critical clusters. The critical clusters perceived sustainability and finance as relative strengths. These were also the zones of greatest coherence. This was partially explained by strong axiological signification and resonance. There was an emphasis on a holistic orientation which enabled semiotic intention across a range of contexts in which the agents could enact sustainability. This, however, requires a broader epistemological range and clear co-evolutionary scope.

The clusters provided a view of the emergence of sustainability which was extended through identifying four modes through which sustainability was enacted. Conditions that support the enactment of sustainability were recognised. Dimensions of coherence that supported the enactment of sustainability were identified on two levels, namely embedded and embodied. The next chapter will discuss the findings with reference to the literature.

CHAPTER 6: DISCUSSION OF FINDINGS

6.1 Introduction

This chapter comprises the cross-case analysis and synthesis of the findings. The findings are discussed with reference to the sustainability literature and are used to further develop the enactment sustainability framework. The research questions are answered, and the finalised framework is proposed and discussed.

6.2 Quantitative cross-case analysis

The quantitative cross-case analysis is presented in this section. Two cases were included in the study. Case A comprised a holding company in Namibia and subsidiaries in Botswana and Zambia. Case B was a Namibian subsidiary of a South African holding company. The clusters of each case will be compared and the levels of coherence in each of the Cassandra axes compared and discussed.

6.2.1 Cross-case analysis of clusters

This section compares and discusses the clusters for each case. The mean scores for each case will first be presented, as this provides context to the comparison of the clusters.

Mean scores

The mean scores for each case are displayed in Figure 6.1. The mean score for each axis is marginally higher in Case A. This is the subjective view of respondents based on a holistic assessment of each business using the Cassandra survey. The diversity axis is most positively rated in Case A, closely followed by sustainability. In Case B, sustainability is highest, followed closely by diversity. Both firms have recently done work on diversity. Whilst both firms have a long track record with corporate social responsibility, corporate sustainability initiatives are fairly new. In Case A, initiatives were being rolled out in the Namibia and Botswana businesses. In Case B the South African holding company has an international reputation for sustainability but sustainability initiatives are nascent in the Namibia business.

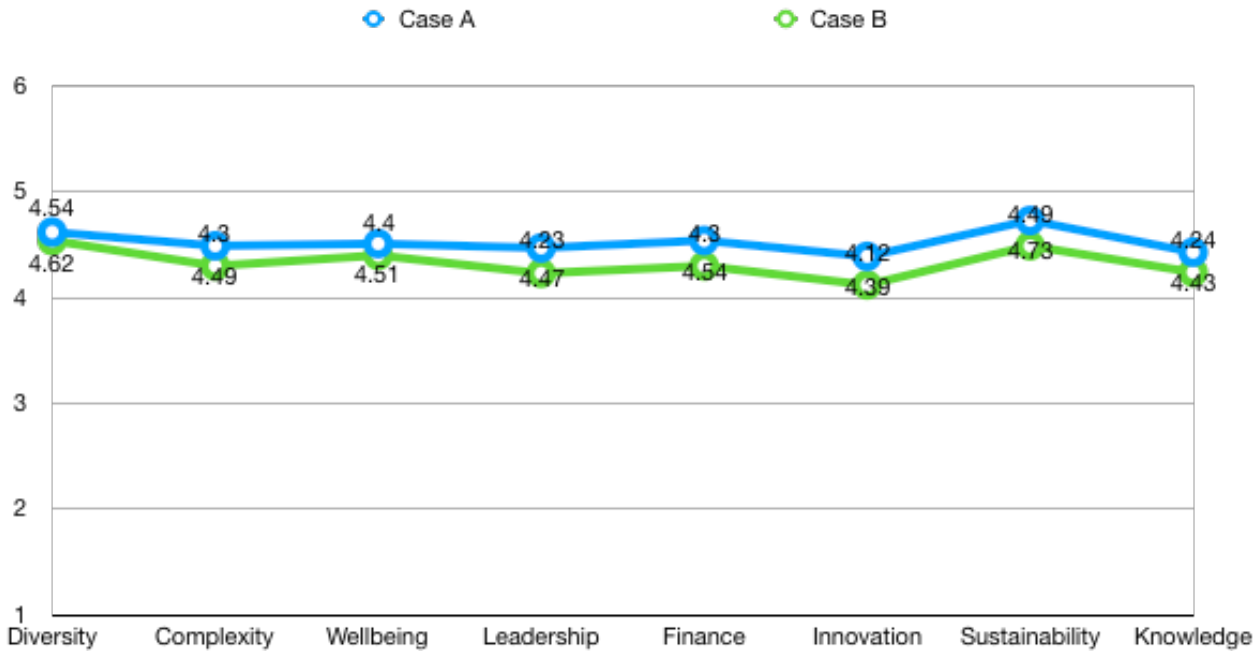

Figure 6.1: Cross-case mean scores

Praise singers

The mean scores for the praise singer cluster for both cases and cluster weights are presented in Figure 6.2. The clusters have very optimistic ratings, with a low level of differentiating between ratings across the axes. This cluster has a heavy weighting (36.68%) for case A, and less so for case B (10.69%).

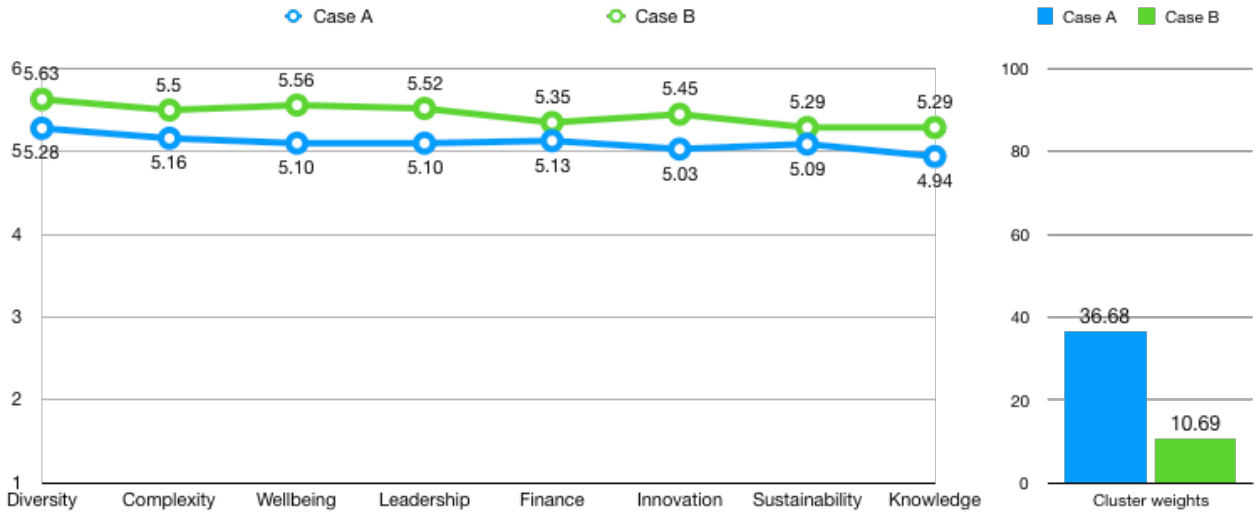

Figure 6.2: Cross-case praise singers cluster scores

This cluster, across both cases, has higher representation from junior management and the branch network. The cluster has lower levels of education. Respondents from this cluster do not differentiate rating much between axes. Several interviewees in both cases commented on these ratings being unrealistic. The metaphor of a praise singer who honours tradition and lineage is particularly relevant to case A in that there was a sense of pride in being a major Namibia-owned bank (90.62% of respondents in this cluster were from the Namibian entity). This interpretation of the high cluster weight (36.68%) in Case A suggests the usefulness of harnessing a sense of national pride in framing sustainability initiatives.

However, interviewees also offered contrasting interpretations. One possible interpretation was lack of thoughtfulness in completing the survey. Another was lack of awareness of the extent of the transition needed to move towards a more sustainable future. The risk, particularly in case A where there is a high cluster weight, is that elevated ratings lead to apathy in addressing, or even recognising, corporate sustainability.

The guardians

This cluster, across both cases, was closest to the mean scores, and had the highest cluster weights in both cases. The cluster profile is presented in Figure 6.3. There is a relatively low level of differentiation between axes.

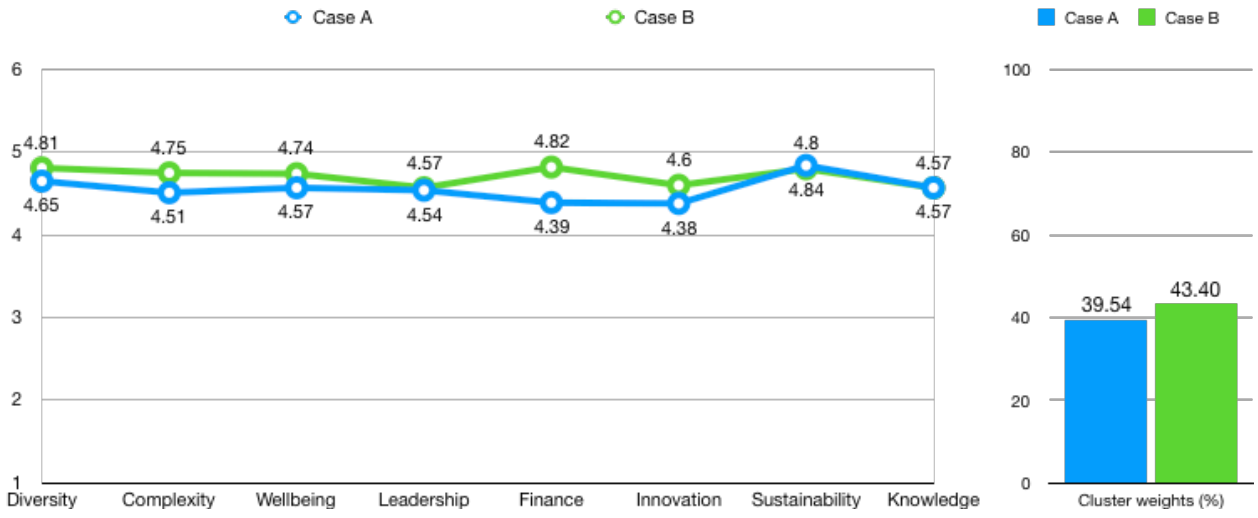

Figure 6.3: Cross-case guardians cluster scores

Both cases have a slightly higher representation from the branch network and female respondents for this cluster. Both cases display slightly elevated sustainability ratings and the

biggest difference between the cases on the finance axis. As discussed in chapter 4, the heatmaps for this cluster in Case A showed disagreement on the finance axis.

The predominance of this cluster across both cases is useful, as there is a substantial proportion of “guardians” of the status quo, but when considered alongside the praise singer cluster (combined weighting in case A of 76.22%, and 54.09% in case B) it does pose the question of whether employees have recognised the challenge at hand. This is particularly concerning when considering the twin challenges, raised by interviewees, of corporate sustainability alongside disruption in the financial services sector.

The pivots

This cluster had the most differentiation in ratings across the axes in both cases, as is displayed in Figure 6.4. The variation of rating data is evident across both cases, but most extreme in Case A. It should be noted that the cluster weight for this cluster in Case A was only 0.86% and represents an outlying group. The weight for this cluster in Case B is 13.84% and thus represents a more established view in the entity.

Figure 6.4: Cross-case pivots cluster scores

Both cases show a substantial drop in at least two axes, including innovation potential, and ratings move in different directions in the finance axis which is a peak for case A and dip for case B. The cluster in both cases has a high representation from the 25-44 years age category,

as well as from respondents who hold a first degree. In case B, this cluster has very strong representation from head office (86.39%). The low cluster weight with the cluster in case A suggests the need to be cautious when interpreting the demographic profiles of these clusters.

The substantial differentiation in rating data for the cluster across both cases suggests the capacity to “pivot” between the different views of other clusters, thereby offering the potential to help different interest groups to find common ground. This is more pronounced in Case B due to the higher cluster weighting, but is a very challenging view in case A given the strong stance on the lack of innovation potential. Outliers, from a complexity perspective, hold the potential to nudge the system.

Devil’s advocate

The devil’s advocate cluster had ratings that fell below the mean across all axes in both cases. The cluster profile is displayed in Figure 6.5. There is still a relatively low level of differentiation between axes. The weighting of this cluster in both cases is moderate, and slightly more so in Case B, thus having the potential to exert influence in the organisation.

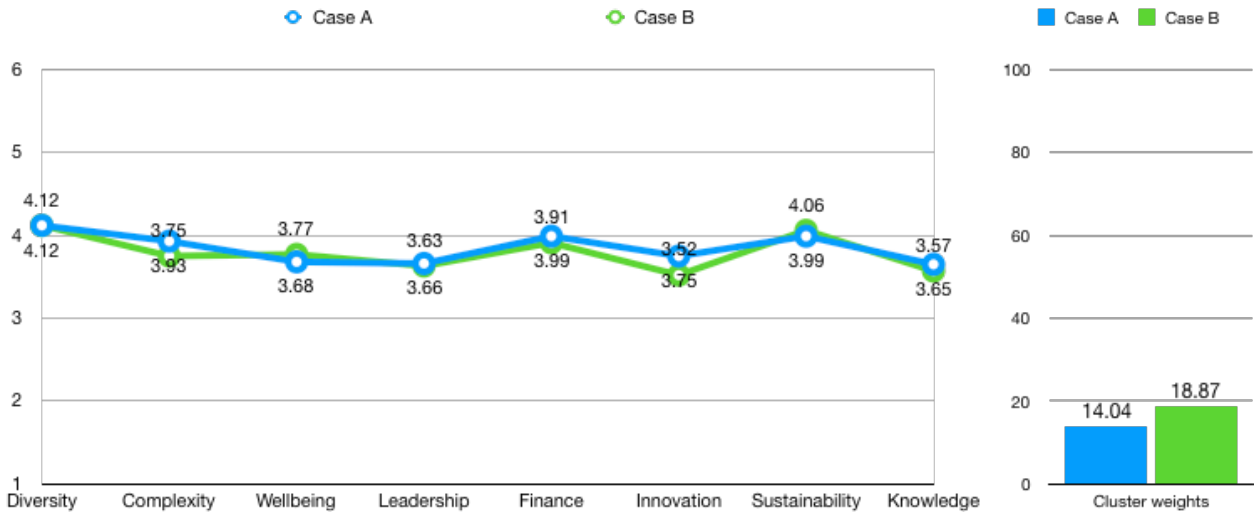

Figure 6.5: Cross-case devil’s advocate cluster scores

The diversity axis is rated the highest, followed closely by the sustainability and finance axes. This shows that respondents who are more critical of the organisation recognise the work done in corporate sustainability and social responsibility. The clusters in both cases have a slightly higher representation of males, which is more pronounced in Case B.

Whilst some interviewees perceived more critical voices in the dataset negatively, positioning these clusters using the metaphor of “devil’s advocate” emphasises the potential importance and helpfulness of more critical views in times of disruption and in the context of the transition to a more sustainable future. The rating pattern across both cases follows the mainstream view (guardians cluster) in both cases, albeit with a more critical view. The metaphor of devil’s advocate is thus useful as this cluster has the potential to challenge, and participate in, the mainstream view.

The resistance

The cluster profile for the resistance cluster for both cases is displayed in Figure 6.6. This cluster has the most critical view in Cases A and B with moderate cluster weightings. The cluster has an 8.88% weighting in case A and an 11.32% weighting in Case B.

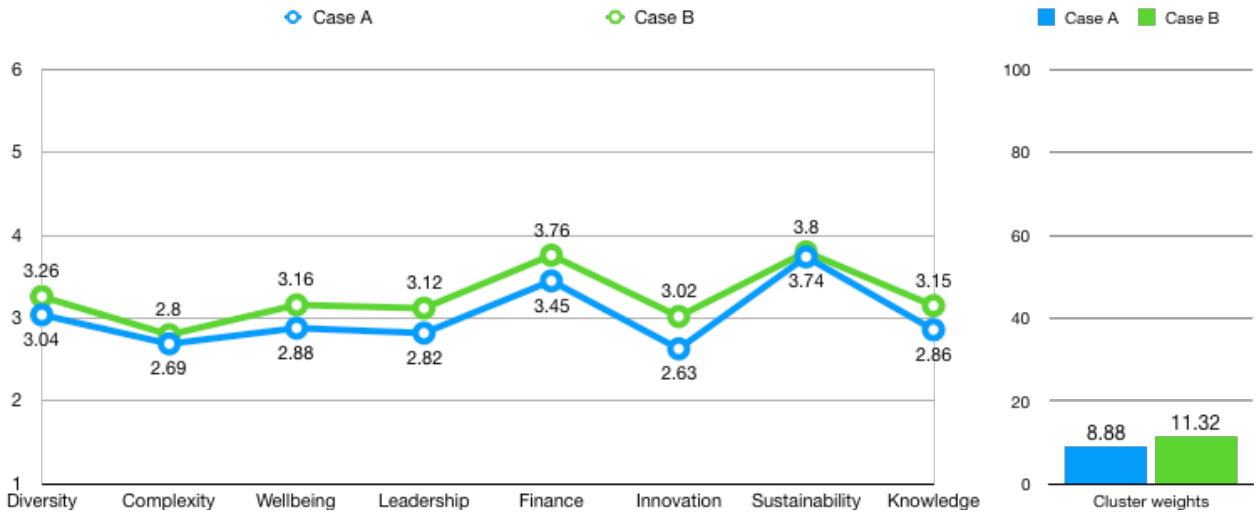

Figure 6.6: Cross-case the resistance cluster scores

The cluster in both cases has a very similar rating profile with peaks in the sustainability and finance axes and a dip in the innovation axis. It is interesting to note that, as is the case with the devil’s advocate cluster, more critical clusters acknowledge the work done in corporate sustainability and corporate social responsibility in the organisation. This can be seen to emphasise progress made in corporate sustainability and corporate social responsibility, since it is regarded as a strength by more critical interest groups. The resistance cluster in both cases can be seen to be a crucial perspective in the transition to a more sustainable future, since the need for transition has to be recognised to enrich co-evolutionary processes. There

was, however, still a tendency amongst many interviewees to see the more critical ratings as a problem to be solved, rather than as a critical perspective to be worked with.

The rebels

This cluster, the rebels, was only identified in Case B. It is an outlying cluster with a weighting of only 1.89%. The cluster profile is displayed in Figure 6.7.

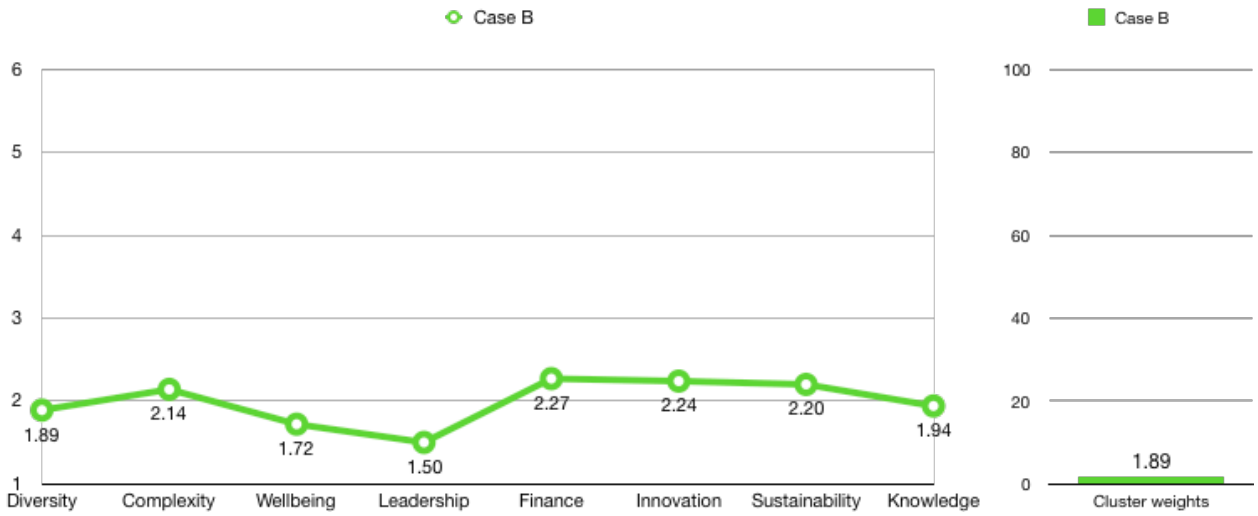

Figure 6.7: The rebels cluster scores

Whilst all the axis ratings are low, the ratings in this cluster are weakest for the leadership and teamwork axis. Several interviewees were concerned about a culture of leadership by fear, which was perceived as incongruent with the business ethos. All interviewees, however, considered this cluster to be overly critical.

Overall discussion

Considering the ratings across all clusters, it is clear that for the most part, the more critical the clusters, the more differentiated the ratings. The vast majority of interviewees, when reflecting on the quantitative dataset, found the view of moderate to critical clusters more compelling and in line with the current state of both organisations. When considering the moderate to more critical clusters, it seems that the sustainability axis is emerging together with the diversity and finance axes. This is congruent with a complexity approach to sustainability, where co-evolution involves self-organisation across diverse networks of agents, and financial performance is an essential aspect of sustainability. All interviewees identified the importance

of focusing on sustainability alongside finance and extended this into a triple-bottom-line focus (Elkington, 2004). Many interviewees, across both cases, were adopting a more holistic view. This involved considering the effects of dynamic and disruptive market conditions, the ethos of the business, and the mindsets of employees in both the business and their personal lives. Fourth wave approaches to corporate sustainability (Baets & Oldenboom, 2009; Brown, 2011; Chapman, 2016; Edwards, 2010; Laszlo et al., 2012; Metcalf & Benn, 2012; Valente, 2012b; Wells, 2013), based on a complexity view of the business, were therefore acknowledged but remained largely aspirational.

The high weighting (36.68%) of the most optimistic cluster (praise singers) in Case A holds the possibility of inhibiting corporate sustainability, as many employees may not be sufficiently aware of the extent of the transition required to move to a more sustainable future. Building the awareness of agents is not necessarily a matter of education, but rather of construing the personal meaningfulness of sustainability initiatives. This needs to be coupled with access to relevant data and feedback on the co-evolutionary processes. The outlying clusters display provocative perspectives which emphasise strengths but also boldly display concerns about the innovation axis in Case A and the leadership axis in Case B. Many interviewees could relate to these concerns. Outlying clusters have the potential to influence or nudge the system.

6.2.2 Levels of coherence

The levels of coherence were scrutinised for instances where the clusters' means converged to create zones of coherence. The convergence in some axes spread across all clusters (zones of coherence), whilst in other axes there was convergence between several of the clusters creating partial coherence or multiple points of coherence. The levels of coherence across both cases are displayed in Table 6.1. Coherent axes are marked in green, partially coherent clusters are marked in amber and decoherent clusters are marked in red.

Cassandra Axis	Integral quadrant	Case A	Case B
Diversity	Lower left	Moderate coherence across all clusters	Moderate coherence across three clusters
Complexity		Moderate coherence across all clusters	Decoherent
Personal wellbeing	Upper left	Moderate coherence across all clusters	Coherence across two clusters
Leadership and teamwork		Moderate coherence across all clusters	Decoherent
Financial performance	Upper right	Coherence across all clusters	Coherence across three clusters, moderate coherence amongst five clusters
Innovation potential		Decoherent	Coherence in two clusters, decoherence in remaining clusters
Sustainable development and social responsibility	Lower right	Coherent, with two points of coherence	Coherence across five clusters
Knowledge and learning		Two points of coherence across two clusters	Coherence across two clusters

Table 6.1: Coherence across cases

Both cases show coherence in the sustainability and finance axes. In Case A sustainability had the lowest standard deviation (0.54), with two points of coherence emerging, one with a more optimistic view, the other with a less optimistic view of progress towards sustainability. The

finance axis in Case A had the second lowest standard deviation (0.76) with a moderate level of convergence across all clusters. Case B followed a similar pattern with five clusters converging in the sustainability axis. The standard deviation of 1.08 was increased by the outlying cluster (the rebels). The finance axis showed convergence of three clusters. The standard deviation of 1.09 was also influenced by the outlying cluster.

Both cases thus showed twin zones of coherence in the sustainability and finance axes, but case A showed a higher level of coherence with all axes except for the innovation axis having a standard deviation of less than 1. Case B had more moderate levels of coherence, with all axes having a standard deviation greater than 1. The diversity and knowledge axes showed a moderate level of coherence across both cases.

It is interesting that the coherent axes all fall within the exterior integral quadrants. A lack of focus on interior quadrants can inhibit development, whereas an all quadrant focus results in the greatest potential for development (Edwards, 2009; Putnik, 2009). However, it must be noted that moderate levels of coherence are found in both cases across all quadrants.

6.2.3 Conclusion

The quantitative cross-case analysis highlighted the importance of clusters with more critical ratings, as these clusters in both cases tended to differentiate more between axes. This more differentiated view of the organisation is important in the transition to a more sustainable future. This was contrasted with more optimistic clusters which displayed lower levels of differentiation, showing a generalised support of the status quo with agents less likely to perceive the extent of the transition towards a more sustainable future. Clusters which were more critical perceived sustainability as a relative strength, thereby endorsing progress that had been made towards sustainability in both organisations. These critical or moderately critical clusters also showed sustainability emerging together with finance and diversity, which supports a view in which sustainability emerges across diverse networks of agents.

Zones of coherence were most prominently seen in the sustainability and finance axes, which showed that they emerged together across both cases. The pattern of coherence across the dataset highlighted a tendency for exterior integral quadrants to be emphasised. Zones of decoherence were different across the cases, with innovation in Case A and leadership and

complexity in Case B, yet all of these areas are important in fast changing environments associated with the sustainability transition.

6.3 Qualitative cross-case analysis

The qualitative cross-case analysis is presented in this section. This strand of the research included the Namibian and Botswanan entities of Case A as well as Case B. The Zambia business (Case A) was included in the quantitative strand but not the qualitative strand of the research. There were, however, a few interviewees who had had recent work experience in the Zambian entity, and these experiences were explored in the interviews and included in the analysis. Case B is a Namibian subsidiary of a South African holding company. Only the Namibian entity was included. The cross-case analysis compared cases and considered interrelationships between the holding company and subsidiary businesses as they related to the emergence of corporate sustainability.

Stake's (2006) cross-case procedure was implemented with themes collated across all three cases. Similarities across cases were used to establish the dimensions, conditions and modes in the Enacted Corporate Sustainability framework. The cross-case analysis considered differences in the emergence of corporate sustainability across the cases. Theme based assertions were identified.

6.3.1 Towards an Emergent Corporate Sustainability Framework

The dimensions and conditions identified across the cases are presented as the Emergent Corporate Sustainability Framework in Table 6.2. The framework recognises four dimensions of coherence which relate to how the organisation is embedded in containing systems, and four dimensions of coherence which relate to the agent's embodiment of corporate sustainability. There are four conditions which enable corporate sustainability to be enacted and modes of enactment for each domain. Similar modes, dimensions and conditions were identified across both cases. The cross-case analysis will compare the way in which these modes, dimensions and conditions showed up across the cases.

	Axiological development	Semiotic development	Co-evolutionary performance	Epistemological performance
Embedded dimensions	Axiological signification	Semiotic symbiosis	Co-evolutionary value	Epistemological range
Embodied dimensions	Axiological resonance	Semiotic embodiment	Co-evolutionary practices	Epistemologically networked
Enactive conditions	Axiological frame	Semiotic intention	Co-evolutionary scope	Epistemological contact
Mode of enactment	Axiological coalition	Semiotic refraction	Co-evolutionary self-organisation	Epistemological extension

Table 6.2: Emergent corporate sustainability framework

6.3.2 Embedded dimensions

The embedded dimensions of corporate sustainability are compared across each case. A summary is presented in Table 6.3. Each dimension is discussed with an emphasis on the interrelationship between holding company and subsidiary. Dimensions which are recognised and embedded are indicated in green, whilst dimensions that are recognised but only partially embedded are marked in amber. Where dimensions are recognised but not embedded, they are marked in red.

Dimensions	Case A (Holding company)	Case A (Subsidiary)	Case B (Subsidiary)
Axiological signification	Signification is well recognised with complex interpretation. Signification weaker in branch network.	Signification is well recognised with complex interpretation.	Signification is well recognised with identified need for complex interpretation
Semiotic symbiosis	Semiotic symbiosis is supported by the axiological signification	Whilst semiotic symbiosis is nascent, it	Semiotic symbiosis is nascent but supported by

	but is held back by lack of implementation.	is still considered as aspirational.	involvement in CSR initiatives.
Co-evolutionary value	Disruption and dynamic market conditions result in emphasis on financial sustainability. International bodies broaden co-evolutionary focus.	Localisation of co-evolutionary value is recognised yet agents struggle to sell longer-term ideas in the business, resulting in the co-evolutionary value being nascent	Tough market conditions emphasise financial sustainability together with strategic partnerships in CSR.
Epistemological range	Disruption in the sector results in a broadening epistemological range. Currently working to collect and integrate a wider range of relevant data associated with sustainability.	Epistemological range extended and supported by holding company, yet not internalised in subsidiary.	There is recognition of systemic interconnection. A lack of local capacity inhibits widening epistemological range in subsidiary.

Table 6.3: Cross-case analysis of embedded dimensions

The dimension of **axiological signification** was well-developed across all cases. The use of signifiers that have an ethical positioning yet are somewhat open seems to offer increased potential for complex interpretation. This means that the signification is open enough for diverse agents to reconceptualise how value is generated with the containing system. The signification was strongest in the head office and less so in the branch networks. Well framed axiological signification offers the potential of reframing the ways in which the business adds value and interacts with the containing system. In Case B, there was evidence to suggest that longitudinal signification supported values-based talent acquisition.

The dimension of **semiotic symbiosis** was recognised as important across all cases, but not yet well-developed. Clear axiological signification is seen as supportive and involvement of agents in CSR initiatives seems to support semiotic symbiosis. This dimension needs to be

fostered in the everyday work activities of agents. Localisation of corporate sustainability is key to the dimension.

The dimension of **co-evolutionary value** is dynamic, and uncertainty in the market increases the focus on financial sustainability. The holding company is positively influenced by membership of international bodies such as the United Nations Global Compact (UNGC). Subsidiaries emphasise the need for localisation of strategies for creating co-evolutionary value. Shifting towards a partnership approach in CSR initiatives increases co-evolutionary value.

The dimension of **epistemological range** is well recognised. Disruption in the sector alongside sustainability targets has resulted in focused initiatives to widen the epistemological range, which requires data integration. Holding company support of subsidiaries helps to widen epistemological range, yet lack of sustainability capacity in subsidiaries in both cases inhibit further development.

In summary, axiological signification is the most developed embedded dimension alongside the financial sustainability aspect of co-evolutionary value. Disruption in the sector puts pressure on financial sustainability whilst raising awareness for a broader conceptualisation of corporate sustainability. This is consistent with the quantitative findings which showed coherence in the sustainability and finance axes in both cases. Epistemological range is actively being widened in Case A, particularly in the holding company. A lack of capacity in sustainability inhibits progress. Semiotic symbiosis is nascent across all entities, which is a risk for the enactment of corporate sustainability.

6.3.3 Embodied dimensions

The embodied dimensions of corporate sustainability are compared across each case. A summary is presented in Table 6.4. Each dimension is discussed with an emphasis on the interrelationship between holding company and subsidiary. Dimensions which are recognised and embodied are indicated in green, whilst dimensions that are recognised but only partially embodied are marked in amber. Where dimensions are recognised but not embodied, they are marked in red.

Dimensions	Case A (Holding company)	Case A (Subsidiary)	Case B (Subsidiary)
Axiological resonance	Axiological resonance is well recognised as a means to holistic development. There is a recognition that embodiment remains aspirational.	Axiological resonance is recognised but still somewhat aspirational, requiring activities to support embodiment.	Axiological resonance shows links with personal values. Resonance inhibited due to management by fear.
Semiotic embodiment	There is a recognition of the importance of embodiment, which can support behavioural responses across both work and personal domains.	Semiotic embodiment is recognised but remains aspirational. It is inhibited by a lack of clarity on how to address sustainability.	Semiotic embodiment is well recognised, in terms of being principle-driven. Since it is still aspirational, the importance of advocacy is noted.
Co-evolutionary practices	There have been activities to integrate sustainability into policies and practices, yet co-evolutionary practices are not yet enacted.	Awareness of the need for co-evolutionary practices to be mindfully applied, as agents do not understand why they should implement practices.	Co-evolutionary practices are mostly confined to participation in CSR activities and work practices focus on short-term targets.
Epistemological network density	There is not only recognition of the importance of this dimension but also extensive efforts to make data relevant to	In the subsidiary there is a tendency to wait for the group, which inhibits integration of local knowledge and the configuration of	There is a recognition of the value of epistemological interconnection, which is perceived to be inhibited by lack of

	sustainability accessible and sufficiently networked. This, however, remains a work in progress.	local epistemological networks to support local knowledge generation.	an innovation function in the subsidiary, and lack of localisation.

Table 6.4: Cross-case analysis of embodied dimensions

The dimension of **axiological resonance** was recognised as important across all cases. Whilst all the cases had well-articulated and resonant axiological frameworks, these frameworks had not been embodied and thus remained to some extent aspirational. Axiological resonance was embodied in Case B, but interviewees noted that this was inhibited through management by fear. Axiological resonance was experienced in a similar way in the holding company and subsidiaries. Management practice has the potential to inhibit or enable this dimension and workplace sustainability-related activities help to support embodiment.

The dimension of **semiotic embodiment** was acknowledged across all cases. However, it remained largely aspirational, requiring advocacy and sensitisation to be further developed. It was recognised as being particularly important as it enables a holistic response which includes - but is not limited to - the agent's work role, extending into the personal sphere of an agent's life, thereby creating a holistic impact across multiple roles and contexts.

The dimension of **co-evolutionary practices** was identified as important across all cases. Whilst there were structured attempts to integrate sustainability into policies and processes in the holding company, efforts were hampered by lack of capacity and were not yet entrenched into mindful co-evolutionary practices. There was less clarity in the subsidiaries about co-evolutionary practices. Co-evolutionary practices were most developed across all cases in the context of CSR initiatives.

The dimension of **epistemological network density** was recognised across all cases. There was more emphasis in the holding company where the epistemological network was most densely networked and less so in subsidiaries and branch networks. The centralisation inhibited local knowledge generation. A combination of centralisation and localisation would be beneficial.

In summary, whilst the embodied dimensions were well recognised across both cases, they remain largely nascent. The dimensions have been positively impacted by the development of axiological and sustainability frameworks but require more focus on implementation to support further development.

6.3.4 Enacted conditions of corporate sustainability

The enacted conditions of corporate sustainability will now be compared across each case. A summary is presented in Table 6.5. Each condition is discussed with an emphasis on the interrelationship between holding company and subsidiary. Conditions which are recognised and present are indicated in green, whilst conditions that are recognised but only partially present are marked in amber. Where conditions are recognised but not present, they are marked in red.

Conditions	Case A (Holding company)	Case A (Subsidiary)	Case B (Subsidiary)
Axiological frame	There is a recognition that sustainability cannot be owned by a particular function but needs to be part of the culture as a shared axiological frame.	The axiological frame is less evident in the subsidiary; however, there is a focus on behaviours that link to sustainability.	The axiological frame is nascent but increasingly supported by axiological signification and the planned green building.
Semiotic intention	There is a focus on developing intention, yet this is held back by agents being unsure of how to address sustainability and not recognising how	There is a holistic and reflective semiotic intentionality emerging in several interviewees which is to some extent inhibited by a	Whilst there is recognition of the importance of agents being intrinsically motivated to enact sustainability, this is perceived to be

	sustainability affects them personally.	short-term emphasis in the business.	inhibited by coercive leadership.
Co-evolutionary scope	There is a need to incorporate sustainability into roles and a need for more sustainability capacity in the business.	Co-evolutionary scope is perceived as nascent since sustainability is new to the entity, yet sustainability is seen to be linked with all functional disciplines.	The link between sustainability, work roles and the business in general is emphasised. This condition is not yet well-developed.
Epistemological contact	The lack of epistemological contact is seen to be associated with the inability of agents to see the link between behaviour and environmental impacts.	A prominent optimistic cluster (praise singers) with a high cluster weighting (36.68%) is associated with a lack of epistemological contact. There is a sense of distance from Group sustainability initiatives.	Epistemological contact is seen as important yet the lack of urgency with respect to sustainability is seen to be associated with insufficient epistemological contact.

Table 6.5: Cross-case analysis of enacted conditions

An **axiological frame**, as a condition of enacted corporate sustainability, was recognised across all cases, but was more developed in the holding company than the subsidiaries. The axiological frame related to the organisational culture whilst being supported by the physical environment.

Semiotic intention was perceived as important, yet it was inhibited in some entities by lack of awareness or agents being unsure of how to address sustainability. There were, however, also instances of holistic reflection in which axiological signification was translated into the agent's context.

Co-evolutionary scope was recognised across all cases, and particular emphasis was placed on linking sustainability to work roles, whilst recognising that sustainability touches every area

of the business. This condition was acknowledged but not yet well-developed in any of the cases.

Epistemological contact was perceived to be important yet there was not yet sufficient epistemological contact for agents to see the links between behaviour and containing system, and this is likely to be associated with an over-estimation of progress of the business in transitioning to a more sustainable future.

6.3.5 Enacted modes of corporate sustainability

The enacted modes of corporate sustainability are compared across each case. A summary is presented in Table 6.6. Each mode is discussed with an emphasis on the interrelationships between the holding company and subsidiary. Modes which are recognised and enacted are indicated in green, whilst modes that are recognised but only partially enacted are marked in amber. Where modes are recognised but not enacted, they are marked in red.

Conditions	Case A (Holding company)	Case A (Subsidiary)	Case B (Subsidiary)
Axiological coalition	The axiological coalition was central to the emergence of sustainability in the group, through which two agents developed a critical mass of support.	This mode was not observed in the Botswanan entity data. Sustainability initiatives were perhaps too recent for this mode to be enacted in the Botswanan entity.	This mode was recognised by interviewees by its absence, yet there was a sense of the importance of being principle-driven.
Semiotic refraction	There was some evidence of semiotic refraction, which enriched the approach to sustainability. A lack	Semiotic refraction was not enacted in the Botswanan entity. It was reported in the Zambian subsidiary as a result of adapting to	There was evidence of semiotic refraction resulting in a more holistic view of sustainability. Interior quadrants (an “inside-

	of differentiation between axes suggested that this mode was still nascent.	protracted disruptions in the local electricity supply.	out" approach to sustainability) were emphasised.
Co-evolutionary self-organisation	The need for co-evolutionary self-organisation was emphasised but acknowledged as a gap inhibited by a lack of awareness and know-how.	This mode was triggered in Zambia by the need for solar energy due to protracted energy supply disruption. This mode was inhibited by red tape in Botswana.	This mode was seen holistically and cross-functionally, moving beyond a siloed approach involving stakeholders and requiring a shift in the mindset of agents.
Epistemological extension	Epistemological extension was emphasised, but not enacted. It was linked to axiological signification and platforms that enabled the sharing of ideas.	There was recognition in the Botswanan entity of the need to widen the temporal horizon of epistemological extension. It was also recognised to be nascent in the entity.	Epistemological extension was recognised but inhibited by a lack of local capacity and an overestimation of the progress towards corporate sustainability.

Table 6.6: Cross-case analysis of enacted modes

Axiological coalitions played a central role in the formalisation of corporate sustainability initiatives in Case A. Starting with just two leaders, the coalition developed a critical mass which was perceived to be associated with substantial momentum being created in corporate sustainability initiatives across the group. A similar process, however, did not seem to have unfolded in the Botswanan entity, and was recognised but not enacted in case B. There was less evidence of this mode in the subsidiaries than the holding company.

The mode of **Semiotic refraction** was seen in the holding company in a way that enriched the group-wide approach to corporate sustainability, focusing on “cultivation” rather than a linear change process; sustainability initiatives were dynamic and decentralised. Localisation was an important consideration - lessons could be gleaned from local co-evolution with the containing system. This mode, when enacted, resulted in valuable insights.

Co-evolutionary self-organisation was recognised across all cases, but still only partially evident. There was recognition of the holistic nature of this mode and the need to involve stakeholders. The lack of awareness or recognition of the extent of the transition to a more sustainable future, coupled with red tape and a lack of know-how, was perceived to inhibit this mode. This may also be due to corporate sustainability initiatives being relatively recent in the businesses.

Epistemological extension was recognised across all cases but still not widely enacted. There seemed to be more emphasis in the holding company context than the subsidiary businesses, and the need to address sustainability in the local context makes this problematic. Links with the axiological domain were perceived to be useful in providing context and direction. Developing systems to support ideation was identified as a means of supporting epistemological extension.

6.3.6 Conclusion

The qualitative cross-case analysis considered the embedded, enacted and embodied levels of emergent corporate sustainability. The embedded level was marginally more developed than the other levels, with a particular strength in axiological signification across all cases. Whilst case A created results through axiological coalitions, case B showed more axiological resonance to be associated with the signification. In both cases this has resulted in a good foundation for corporate sustainability being established, yet both cases showed less development in co-evolutionary scope and practices. This indicated that many of the sustainability initiatives had not yet translated into agents having a clear understanding of how they contributed towards sustainability and developing practices associated with sustainability.

Whilst the need for epistemological development was highlighted by disruption in the financial services industry, it seemed that a centralised approach hampered epistemological

development and progress towards sustainability. This was seen in Case B where epistemological range and epistemological network density were inhibited by limited focus on localisation in the group. Learning from local contexts played a crucial role in one of the subsidiaries in Case A and was shown to have benefits across all integral domains.

6.4 Synthesis and discussion of findings

This section discusses the mixed method cross-case synthesis of the findings. Following an explanatory sequential mixed method design, the qualitative data are used to explain the quantitative results. Understanding the emergence of corporate sustainability was found across multiple levels of system, namely the embedded, enacted and embodied levels. Each level was found to operate across all integral quadrants. Each level is explained and used to answer the research questions. The emergent corporate sustainability framework is discussed and inferences are drawn.

6.4.1 Emergent corporate sustainability

This section answers the first research question, namely, *how does sustainability emerge in financial institutions?* Corporate sustainability emerges through the enactment of four modes, as is displayed in Figure 6.8. Each mode is associated with a condition of enactment. The modes are common to both cases. There are recursive links between the modes. Emergence is depicted by the wave symbol in the figure.

The process of emergence of corporate sustainability was well-defined by an executive in Case A as “cultivating a garden” (AN15). This metaphor is useful as it acknowledges the fluidity of emergence, where agents work with and respond to how sustainability develops rather than try to plan and control it in a linear manner.

Axiological coalitions develop when a shared axiological frame is enacted. This was most pronounced in Case A where the initial sustainability initiatives of two executives were met with

indifference, and an axiological coalition was developed over an extended period until a "critical mass" was reached (AN15).

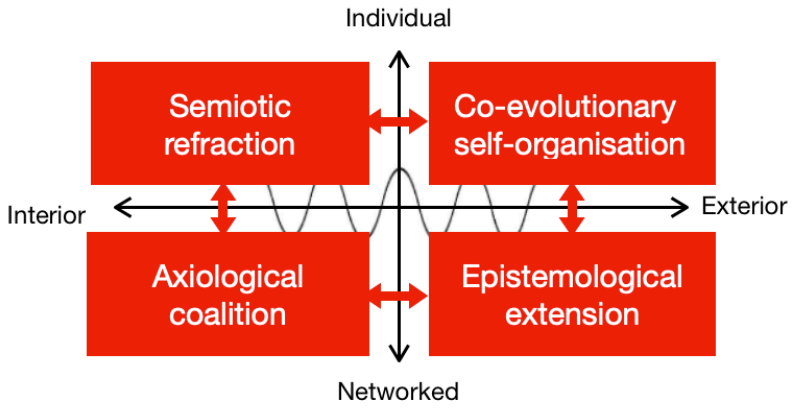

Figure 6.8: Enacted modes of emergent corporate sustainability

The enactment of sustainability requires sufficient epistemological contact, whereby agents recognise the importance of enacting corporate sustainability. Enacting sustainability involves epistemological extension, as co-evolutionary self-organisation requires new knowledge to be generated. Agents move back and forth between modes as the process of emergence unfolds.

The emergence of corporate sustainability can be conceptualised as shared perceptual waves that perturb the current system functioning. This was illustrated in the clusters identified in the self-organising maps. The majority of respondents had very optimistic and undifferentiated views of their organisations (76.22% in Case A, and 57.24% in Case B), and might not have fully recognised the extent of the transition required to move to a more sustainable future. Whilst these optimistic clusters (guardians, praise singers) play an important role in maintaining the status quo in an organisation, the presence of clusters which adopt a more critical and differentiated view is important in the emergence of corporate sustainability.

In both cases, there were two clusters (devil's advocate, the resistance), with a substantial combined weighting (22.92% in Case A, and 30.19% in Case B), which adopted both a more critical and more differentiated view. Importantly, in both cases sustainability, finance and diversity were rated more critically than in the optimistic clusters, but more positively relative to the other dimensions. This recognises the emergence of sustainability alongside financial performance and diversity, whilst indicating that there is still a substantial journey ahead. The notion of the axiological coalition can be seen as diverse groupings which are represented by multiple clusters, each with a differentiated view. Outliers can be seen as possible nascent

axiological coalitions. Sustainability can thus be seen to emerge through four modes in a self-organised co-evolutionary manner.

6.4.2 Coherence in emergent corporate sustainability

This section answers the second research question, namely, *what is the role of coherence in the emergence of sustainability*? Coherence can be seen as the co-evolution of the integral quadrants (Edwards, 2010). Corporate sustainability is not something added to, or integrated into, the system, but rather a fundamental shift in the way in which the system operates. Zones of coherence are associated with the emergence of co-evolutionary self-organisation. Since the system and its containing system are both dynamic and continuously evolving, the output cannot be seen as a steady state, but rather a co-evolutionary process in emergent spacetime.

Corporate sustainability as a co-evolutionary emergent process brings together dimensions that describe coherence embedded in the containing system, as well as coherence embodied in the agent. These are displayed in Figure 6.9. Four dimensions of coherence were identified at each level. Coherence, a property of emergent phenomena, occurs when lower level components are established as higher level integrated wholes which maintain some sense of consistency and identity (Goldstein, 2000).

The strongest zones of coherence between the clusters from the self-organising maps were found, in both case A and case B, in the sustainability and finance axes. This suggests that sustainability was emerging alongside financial performance. Seen in this way, financial performance and sustainability are co-implicative. This confirmed Putnik's (2009) observation that organisations tend to put less emphasis on exterior integral quadrants, yet coherence with interior integral domains was found to be essential to co-evolutionary self-organisation and the emergence of corporate sustainability.

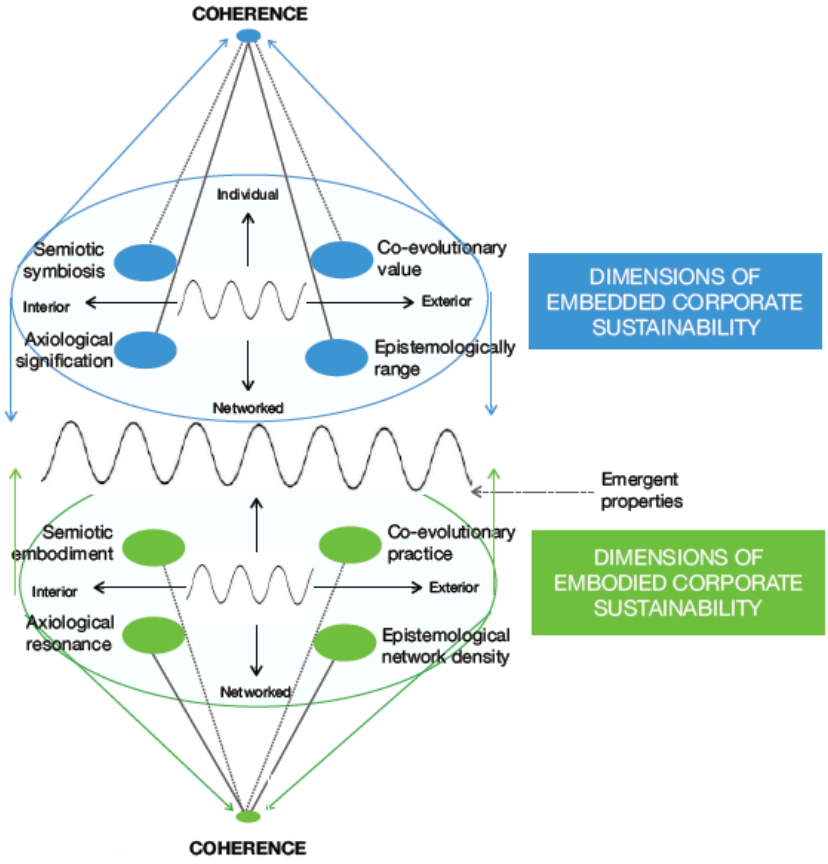

Figure 6.9: Dimensions of emergent corporate sustainability

For a co-evolutionary process of emergence to ensue, this study finds that a firm has to go further than integrating sustainability into the business. A context in which co-evolutionary process emerges is created when coherence develops at both the embedded and embodied levels of system. This context results in conditions which allow for agents to enact corporate sustainability.

Embedded coherence was associated with emergence at the level of the firm, as described by the dimensions of axiological signification, semiotic symbiosis, co-evolutionary value and epistemological range. Embodied coherence was associated with emergence at the level of agent, as described by the dimensions of semiotic embodiment, axiological resonance, epistemological network density and co-evolutionary practice.

Axiological signification was well-developed in both cases, which supported a normative context in which corporate sustainability could emerge. When embodied at the level of agent,

this is experienced as axiological resonance. Whilst signification was strong in both cases, axiological resonance was embodied in Case B and partially embodied in Case A. The embodiment is important as it interacts with the semiotic structures of the agent towards self-organisation. Semiotic symbiosis is nascent across both cases, implying a lack of symbiotic interaction with the containing system. Semiotic embodiment was nascent in Case A and partial in Case B. This translates into a lack of co-evolutionary practices, which in turn inhibit the creation of co-evolutionary value. The importance of extending the epistemological range was highlighted in the findings. Whilst this is being actively worked with in Case A, Case B illustrates how it is insufficient to extend epistemological range in a centralised manner at the holding company; it must also be addressed in a way that considers, and interacts with, local contexts. Thus, in summary, when coherence develops simultaneously at multiple levels of system a context is created in which corporate sustainability emerges.

6.4.3 Conditions of emergent corporate sustainability

This section answers the third research question, namely, *what conditions enable the emergence of sustainability*? A condition associated with each integral domain was identified, namely, axiological frame, semiotic intention, co-evolutionary scope and epistemological contact. Together these conditions help to create a context in which corporate sustainability is enacted. It is important to note that these conditions themselves emerge dynamically, rather than being fixed properties which are constructed intentionally. The conditions of emergent corporate sustainability are displayed on the integral quadrants in Figure 6.10.

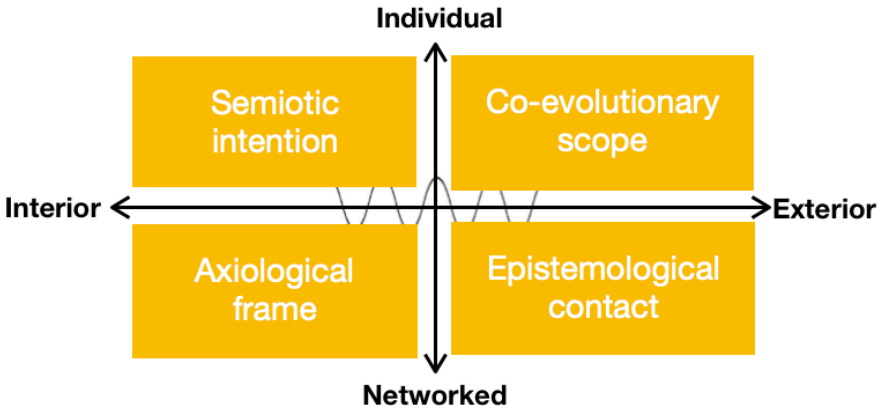

Figure 6.10: Conditions of emergent corporate sustainability

An axiological frame emerges when axiological signification resonates with the agent. Semiotic intention appears when an agent prepares for co-evolutionary self-organisation. It emerges when meaningfulness is symbiotically established between the firm and containing system and embodied at the level of agent. Co-evolutionary scope describes the scope of contribution possible by an agent, which emerges between the practices of the agent and value created with the firm and containing system. Epistemological contact results when sufficient and comprehendible feedback allows for an agent to grasp the current context in which sustainability needs to be enacted.

Moderate levels of coherence in the axes across the upper and lower left integral quadrants (personal wellbeing, leadership, diversity and complexity axes) can be partially explained by most of the conditions being nascent. Co-evolutionary scope forms the basis for agents to enact sustainability. This condition is important in providing freedom to self-organise within necessary boundaries. The nascent conditions also partly explain the high sustainability ratings, where agents do not have sufficient epistemological contact to perceive the extent of the sustainability transition.

The emergence of corporate sustainability is well-defined by the cultivation metaphor in which a context is created in which corporate sustainability is enacted. A gardener can neither force plants to grow nor control the weather but can create a supportive context and respond to the dynamic interaction between levels of system as they arise.

6.4.4 Emergent corporate sustainability framework

The emergent corporate sustainability framework, depicted in Figure 6.11, explains how corporate sustainability emerges through self-organisation as opposed to a change process in which sustainability is added to a system. The framework guides managers and organisations to develop coherence between the employee (agent), organisation and containing system to support the development of conditions to encourage employees to act towards sustainability outcomes in a self-organised manner. This addresses the issue of failure to act due to apathy, as well as sluggish change associated with mechanistic compliance-driven approaches.

The framework enhances the initial conceptual model presented in chapter 2 (Figure 2.10) by expanding the sustainability axis of the Cassandra model across the integral quadrants. Dimensions are identified in each quadrant at embedded and embodied levels. The enacted level is modelled through identified conditions that allow for corporate sustainability to be enacted through four modes. More specifically, sustainability is enacted through axiological coalitions, whereas the semiotic intention of agents is enacted in a self-organised co-evolutionary process, enabling epistemological extension. In this way, zones of coherence develop through interaction between order, disorder and organisation.

Each level of the framework is built using the integral quadrants. The embedded dimensions connect the firm with the containing system, creating the possibility for zones of coherence to develop between the firm and containing system. It should be noted that whilst this is displayed in Figure 6.11 as a single zone of coherence, in reality it is multiple since the firm is embedded in multiple containing systems concurrently.

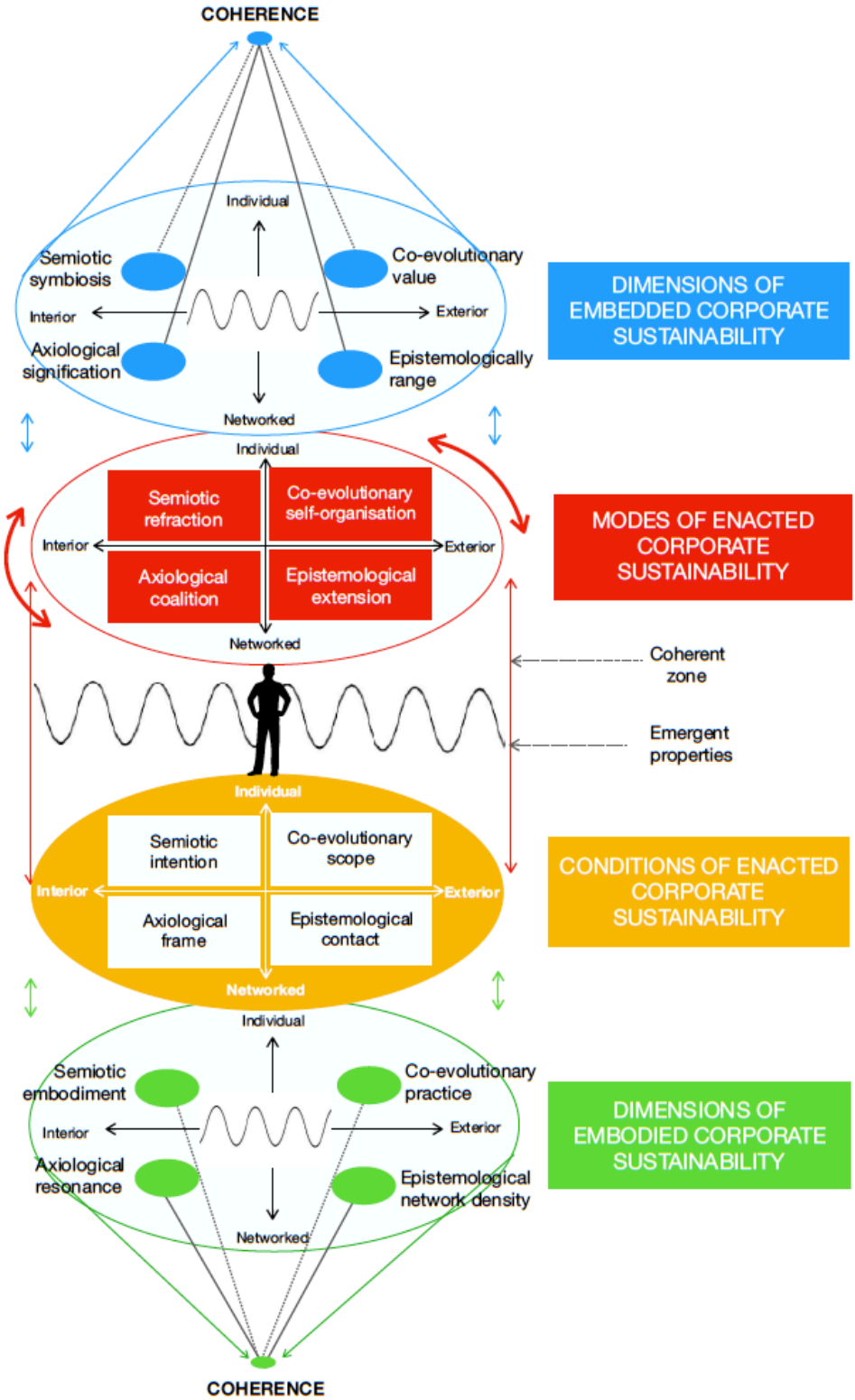

Figure 6.11: Emergent corporate sustainability framework

Embodied dimensions connect the organisation with the agent. The agent is also a complex adaptive system. Coherence within this nested hierarchy allows for zones of coherence to develop between the embedded and embodied levels which creates the necessary conditions in which a self-organised co-evolutionary process emerges. Cultivating zones of coherence thus was found to be a useful way to support the emergence of corporate sustainability. Again it should be noted that whilst this is displayed in Figure 6.11 as a single zone of coherence, in reality it is multiple since embodiment occurs between multiple agents in the system concurrently.

Since corporate sustainability as an emergent process cannot be understood in a linear sense in which a temporal sequence can be specified to manage change, the framework depicts dimensions that describe the extent to which coherence between the organisation and containing system (embedded dimensions) and between the organisation and agent (embodied dimensions) is present. When these are simultaneously developed, four conditions emerge between the organisation and agent which support the emergence of corporate sustainability by means of four enacted modes of corporate sustainability. This creates a zone of coherence - indicated by the red cylinder in Figure 6.11 - in which agents enact sustainability by using the modes to move across each integral quadrant as depicted by the red curved arrows.

An emergent approach has the advantage of greater effectiveness and efficiency in dealing with complex issues that are difficult to address when there is too much emphasis on hierarchical compliance-driven change management. The emergent corporate sustainability framework offers an alternative and complementary approach which seeks to create a bridge between the value orientations of the individual agent, organisation and stakeholders. Whilst this might be difficult to achieve, it offers the benefit of a holistic and self-organised approach in which agents gradually shift patterns of behaviour individually and within the various systems in which they participate, as they respond within a negotiated mandate for action (co-evolutionary scope) to ongoing feedback (epistemological contact) from the environment.

In this way, it is possible to forge ahead with renewed hope, as agents gradually redefine their relationship with containing systems. Since the containing system is a dynamic process, this is an ongoing co-evolutionary process. When corporate sustainability is approached as an emergent process, we can harness the very best of what agents care about and can contribute, as opposed to attempting to change people through fear or force. Ultimately, new

practices become embodied over time and generate their own momentum. This makes ongoing epistemological contact through feedback mechanisms crucial to ensure that practices remain co-evolutionary. An emergent approach, fostered through building coherence, thus offers the possibility to redefine what it means to be human, and together shape a different world which allows for life in all its diversity to prosper.

6.4.5 Conceptualising emergent corporate sustainability

The transition to a sustainable future, at its most fundamental, can be seen as a problem of learning to operate in complexity (Baets & Oldenboom, 2009; Barin Cruz et al., 2006; Chapman, 2013; Edwards, 2009b; Esbjörn-Hargens, 2010; Espinosa & Porter, 2011; Metcalf & Benn, 2012; Morin, 2008; Swilling & Annecke, 2012; Wells, 2013). This study sought to use a complexity lens to understand how corporate sustainability emerges, thereby extending the application of complexity theory into the corporate sustainability literature. Whilst research has addressed the integration of sustainability into business (Mosher & Smith, 2015), and embedding it in the culture of a business (Bertels et al., 2010), this research considered corporate sustainability as an emergent process; the results of this study suggest that sustainability is not added to a system, but is more usefully seen as a process of emergence which fundamentally changes the way in which the organisation as complex adaptive system functions.

Sustainability is not a stable end state but rather a continuous process of self-organising co-evolution with the containing systems in which the business is embedded. For sustainability to be enacted, this must also take place at the level of agent who must co-evolve with the business. The development of zones of coherence across the embedded, enacted and embodied levels of corporate sustainability results in a shift towards the sustaincentric paradigm (Gladwin et al., 1995; Valente, 2012), where it becomes a way of life in the organisation.

The researcher's interest was to understand how this process of emergence occurred and under what conditions coherence developed, thereby enabling the process of emergence. From the findings of this study, coherence is conceptualised as a zone between the embedded and embodied levels of corporate sustainability in which co-evolutionary processes emerge.

Zones of coherence were identified primarily in the finance and sustainability axes alongside partial points of coherence across other axes.

The metaphoric description of cultivating the garden of corporate sustainability is reminiscent of Morin's (2008) recursive interaction between order, disorder and organisation, where the gardener focuses on creating a supportive context by responding to the dynamic interaction between different levels of system. It is through this interaction that zones of coherence develop, which create the conditions from which co-evolutionary self-organisation emerges. It is therefore important to note that full coherence should not be seen as an ideal to strive towards, since emergence arises through the interactive re-encounters, resulting in new zones of coherence or the expansion or diminishing of existent zones of coherence, as displayed in Figure 6.12.

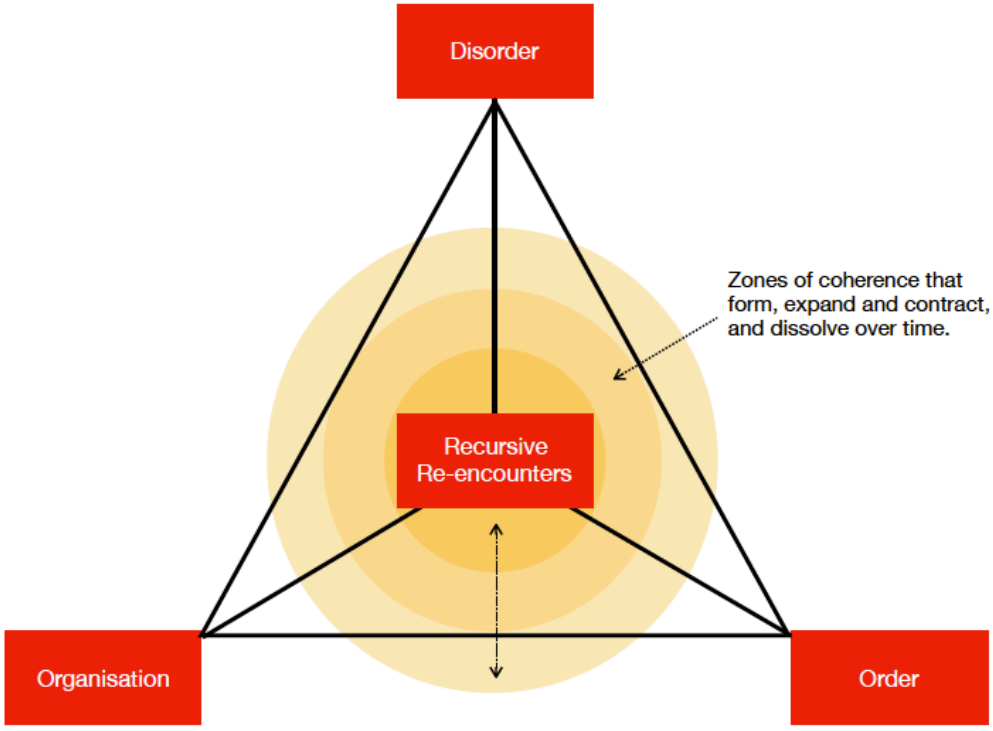

Figure 6.12: Zones of coherence and the retroactive principle

Source: Adapted from Barin Cruz et al. (2006, p. 876)

The process of co-evolution with containing systems moves dynamically through recursive re-encounters between order, disorder and organisation. A complex relation develops through the

interaction of order, disorder and organisation (Morin, 2008). Some disorder allows for change and innovation, which through interaction with order, allows for the emergence of co-evolutionary organisation. Thus the interaction of the parts, systems and environment give rise to the emergent behaviour of the system (Cilliers, 1998).

This study showed corporate sustainability to be a co-evolutionary process in emergent spacetime where sustainability emerges through the interaction between all integral quadrants at multiple levels of system. This questions the typical emphasis on either exterior or interior quadrants, as found in Icarian (first wave) and Sisyphean (second wave) corporate sustainability (as discussed in chapter 2), which rely on a mechanistic approach to driving sustainability through normative change or compliance-driven instrumentalist change. Emergence of corporate sustainability has been shown to develop across all integral quadrants and multiple levels of system. The study enriches our understanding of a Promethean (fourth wave) approach to corporate sustainability by showing the modes by which corporate sustainability is enacted, and the conditions which are associated with this emergence.

Coherence was shown to develop at embedded, enacted and embodied levels. Four dimensions at the embedded and embodied levels were identified. Four conditions and four modes were recognised at the enacted level. The modes, conditions and dimensions all extend our understanding of how the integral quadrants (Edwards, 2010; Wilber, 2001) are associated with the emergence of corporate sustainability. The Cassandra domains (Baets & Oldenboom, 2009) were adapted to focus on the emergence of corporate sustainability, and are displayed in Figure 6.13.

The values domain is positioned as ongoing axiological development, emphasising the development of values as an emergent process. As the domains are associated with dimensions of coherence operating at embedded and embodied levels of system, zones of coherence develop through this interaction and result in conditions in which corporate sustainability is enacted. This interaction between order, disorder and organisation (Morin, 2008) occurs in a similar way across all domains.

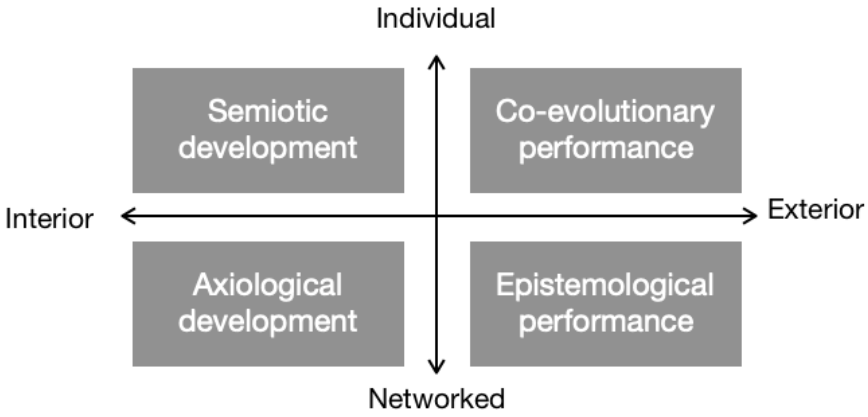

Figure 6.13: Domains of emergent sustainable sustainability

Source: Adapted from Baets and Oldenboom (2009)

The domain of personal development is adapted to focus on semiotic development. A focus on the system of meaning-making was found to be central to the self-organisation of agents. The semiotic process is, in itself, a complex system of signs (Cilliers, 1998). This domain, in particular, highlights the need to shift towards a notion of "cultivation" of corporate sustainability. Since the process of emergence can't be developed in a mechanistic sense, the metaphor of cultivation offers a more holistic and systemic orientation where the "change agent as gardener" cultivates through reacting to dynamics and interactions at different levels of system and uses feedback loops to respond to emergence in the system. As the axiological and semiotic domains interact, a context for self-organisation is established.

The mechanistic performance domain has been adapted to focus on co-evolutionary performance. Co-evolutionary value was found to emerge through the self-organisation of agents, responding to the context created in the interaction between the processes of axiological and semiotic development occurring at multiple levels of system. This context both enables and constrains agent behaviour through local interaction and evolutionary processes (Stacey, 2010).

Since climate change and sustainability are ontologically plural and epistemologically distant (Esbjörn-Hargens, 2010), the epistemological development domain is important not only to address novelty in the system but also to grasp the plurality of the phenomena and to find

ways of creating epistemological contact with the agent. This provides crucial feedback to the other domains and the overall process of emergence of corporate sustainability.

6.4.6 Conclusion

This chapter presented a cross-case analysis of the quantitative and qualitative data. The quantitative cross-case analysis showed that the more critical the ratings, the more differentiated the view of the organisation, which emphasised the value of more critical opinion groups in supporting the transition to sustainability. Both cases showed more critical clusters acknowledging progress towards sustainability, along with the diversity and finance axes. An overly optimistic and undifferentiated view, whilst useful in maintaining the status quo, may inhibit sustainability. Coherence was found in both organisations to be more present in sustainability and finance, which emerged together; there was also a tendency for the organisations to prioritise exterior integral quadrants.

The qualitative cross-case analysis showed the embedded level of corporate sustainability as marginally more developed, with a particular strength in axiological signification across all cases. There was less development in co-evolutionary scope and practice, indicating that agents had not yet developed practices to enact sustainability initiatives. The importance of epistemological development was highlighted by interviewees, which can be partially seen as a consequence of sustainability initiatives and disruption in the industry. A key insight was the importance of localisation in extending epistemological range as the business co-evolves with the local containing system.

The synthesis of the quantitative and qualitative cross-case findings revealed a view of corporate sustainability as an emergent process, whereas the study showed that sustainability is not added to a system but is more usefully seen as a process of emergence which fundamentally changes the way in which the organisation as complex adaptive system functions. A framework for emergent corporate sustainability was presented and the three research questions were answered.

Sustainability was shown to be enacted through axiological coalitions, whereby the semiotic intention of agents emerges as a self-organised co-evolutionary process, enabling epistemological extension. In this way zones of coherence develop through the interaction of

order, disorder and organisation. The modes, conditions and dimensions of emergent corporate sustainability were found to be common across all cases but displayed at different levels of development.

The framework extends the application of integral theory to corporate sustainability, focusing on how coherence develops across multiple levels of system. Seen in this way, corporate sustainability is supported by cultivation through responding to dynamics and interactions at different levels of system and using feedback loops to respond to emergent patterns in the system.

The findings of this study suggest that emergent corporate sustainability is an effective approach to corporate sustainability. The findings are now summarised and positioned in a more pragmatic manner, so that the applicability to organisations is clear:

- Sustainability is not something that is added to, or integrated into, the organisation. It is a fundamental and holistic change in the way in which an organisation functions. This means that sustainability should not be confined to a specific portfolio, nor should it be the sole responsibility of a particular sponsor.

- Groups of employees with more critical and discerning views of the organisation are crucial to the emergence of sustainability. Rather than labelling these groups of employees as disengaged or trouble-makers, they should be valued and given a voice to support emergence. Diversity and inclusion are key to enabling the interaction of a wide range of opinion groups.

- Sustainability is best understood holistically, across all integral quadrants. The formulation of sustainability messaging (axiological signification) is a crucial aspect of building a coherent value orientation. However, sustainability messaging which is not personally meaningful to employees or backed up by sustainability initiatives and knowledge management runs the risk of inhibiting corporate sustainability. Strong sustainability messaging can result in large groups of employees and key stakeholders over-estimating the progress of the organisation towards sustainability and therefore not initiating or supporting sustainability initiatives.

- Corporate sustainability emerges through a process in which the actions of agents are based on what they perceive to be personally meaningful. Where there are sufficiently coherent values, employees come together to form coalitions which enable them to more effectively initiate and support sustainability activities collectively. For these to develop in a co-evolutionary manner, the coalitions of employees need regular feedback to extend their knowledge relating to sustainability activities. These are the modes by which sustainability is enacted. For these modes to be enacted, organisational values must be co-created with employees and stakeholders. Employees should be supported to find ways of making work personally meaningful. There needs to be a clear mandate in which employees can engage in sustainability initiatives, providing both freedom to act and boundaries to ensure the system remains organised. Finally, organisations need sufficiently developed knowledge management systems to ensure that feedback from the environment is accessible and understandable for employees.

- Since corporate sustainability is essentially a co-evolutionary process, organisations should guard against relying too strongly on a centralised approach. Whilst some aspects can be centralised, this study showed that important progress towards sustainability was made by subsidiaries addressing local constraints. It is thus important to encourage local sustainability initiatives, and importantly, to build capacity and focus on knowledge management at a local level.

These findings and practical implications for organisations are not provided as an easy short-cut towards achieving corporate sustainability. They are probably more challenging than integrating corporate sustainability through linear change and compliance-driven approaches. The extensiveness of the transition to a more sustainable future, however, is too vast to rely on centralised mechanistic approaches to change alone. Emergent corporate sustainability acknowledges the importance of interior quadrants with their subjective and inter-subjective emphasis. Balancing the typical exterior objective focus with interiority is crucial if we are to have any hope of co-evolutionary self-organisation. The next chapter concludes the study, providing recommendations for future research and practice.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This study sought to contribute to the understanding of the emergence of corporate sustainability in organisations operating in the financial services sector in Southern Africa. The process of emergence was studied by means of a holistic business assessment using self-organising maps. This showed sustainability emerging alongside finance and diversity and indicated that more critical interest groups (devil's advocate and the resistance clusters) had a more differentiated view of the organisation and acknowledged progress towards sustainability.

Corporate sustainability was shown to emerge through the enaction of four modes. Co-evolutionary self-organisation occurred when zones of coherence were created between embedded and embodied levels of corporate sustainability. This resulted in necessary conditions being present. This chapter articulates the contribution of the study to the academic literature and goes on to discuss limitations of the study, and recommendations for future research and practice.

7.2 Contribution of the study

Despite an increasing focus on corporate sustainability, there is an enduring disconnect between corporate sustainability activities and the ongoing decline in the global environment and society (Dyllick & Muff, 2016; von Weizsaecker & Wijkman, 2017). For over two decades, researchers have called for a paradigm shift in which economic domains are balanced with social and environmental domains (Gladwin et al., 1995; Hart, 1995; Shrivastava, 1995), yet corporate sustainability is not sufficiently enacted, and there has been a dearth of empirical studies that advance our understanding of how this shift takes place (Valente, 2012). To achieve this, a better functional fit is required between organisations and their containing systems (Metcalf & Benn, (2012).

Corporate sustainability and the transition to a more sustainable future are underpinned by the need to counter reductionism and embrace complexity (Baets & Oldenboom, 2009; Barin Cruz et al., 2006; Chapman, 2013; Edwards, 2009b; Esbjörn-Hargens, 2010; Espinosa & Porter,

2011; Metcalf & Benn, 2012; Morin, 2008; Swilling & Annecke, 2012; Wells, 2013). A complexity approach was thus adopted in this study and corporate sustainability was conceptualised as a self-organised co-evolutionary process of emergence. The study makes three contributions to the understanding of corporate sustainability as a process of emergence.

First, four modes by which corporate sustainability is enacted are proposed. These modes extend our understanding of how the integral domains are enacted in corporate sustainability. Corporate sustainability was shown to emerge when axiological coalitions were able to develop critical mass towards co-evolutionary self-organisation. This allowed for both semiotic refraction (enriched view of sustainability) and epistemological extension (development of knowledge), which together supported the enaction of corporate sustainability. The process of emergence was supported by more critical clusters of agents who were able to perceive the organisation more holistically, giving rise to a more differentiated view of the organisation. Dialogue between opinion groups was supported by an emphasis on diversity and inclusion. This responds to the call by Valente (2012) for advancing our understanding of how corporate sustainability is enacted.

The second contribution extends our understanding of the process of emergence by articulating how zones of coherence develop and support emergence. Coherence was identified by four dimensions at both an embedded (coherence between company and environment) and embodied (coherence between employee and company) level of system. Zones of coherence across both cases were most prominent in the sustainability and finance axes. The conceptualisation of zones of coherence advances our understanding of Morin's (2008) retroactive principle by showing how zones of coherence form, expand and dissipate as the process of co-evolution with containing systems moves dynamically through recursive re-encounters between order, disorder and organisation. This focuses attention across integral domains whilst simultaneously considering the interactions across levels of system.

The third contribution arises from this process, as this complex relation develops through this interaction and gives rise to conditions which are associated with the emergence of corporate sustainability. Understanding the conditions associated with enacted corporate sustainability is crucial to closing the gap in our understanding of how the shift to corporate sustainability occurs. Four conditions, which span across all integral quadrants, were identified. The conditions help to refine our understanding of the need to "cultivate" sustainability rather than

integrate it or drive it as a change process. The conditions also help to explain how to move beyond the typical emphasis of organisations on exterior integral quadrants in corporate sustainability (Putnik, 2009). Finally, a comprehensive emergent corporate sustainability framework was presented which explains how these conditions emerge from the interaction between the embedded and embodied dimensions and give rise to the enaction of corporate sustainability by means of four modes.

These contributions serve to enhance the integral literature on corporate sustainability and extend existing frameworks such as those developed by Edwards (2009) whilst responding to Esbjörn-Hargens's (2010) observation that complex phenomena such as climate change and corporate sustainability are ontologically plural and espitemologically distant. The emergent corporate sustainability framework advances our understanding of how these challenges can be addressed through co-evolutionary self-organisation. Finally, the framework advances our understanding of how to operationalise aspects of the complexity framework developed by Wells (2013) in the context of corporate sustainability by repositioning corporate sustainability as a process of emergence rather than something to be added to, or integrated into, the business.

7.3 Limitations

This section identifies key limitations of the study, discusses the implications of each limitation, and describes how the limitations have been addressed or could be addressed in future research and practice.

7.3.1 Scope limitations

A weakness in the study was not including the holding company of Case B. This would have provided two similar embedded cases and strengthened the cross-case analysis allowing for a more robust comparison both between holding companies and between holding company and subsidiaries.

A further limitation of the study is that it didn't include respondents from the containing systems in which each company was embedded. By including respondents from the transactional and contextual environments, the embedded aspects of the sustainability

framework could have been strengthened. Furthermore, including sustainability consultants and similar external industry experts would have provided a valuable point of reference in the analysis.

7.3.2 Response bias

Several respondents commented that some clusters in both cases were overly optimistic with heavy weightings. The possibility of a response bias needs to be considered. Since corporate sustainability is ontologically plural (Esbjörn-Hargens, 2010) and emergent spacetime is best considered from a co-constructivist perspective (Morin, 2008), it is unhelpful to attempt to grasp what is “true”; it would be more useful to consider the implications of the perspectives which are enacted.

Where there are large clusters of agents with very optimistic ratings across all categories (in case A, the guardians and praise singers had a combined weighting of 76.22%), it is important to consider the effects on the process of emergence, rather than getting caught up in whether the view is correct, as has already been elaborated upon.

7.3.3 Statistical methods

The application of the self-organising maps using composite scores of the axes, as opposed to the individual items, reduced the granularity of the data. This was implemented due to limitations of the software used in the analysis. Applying a self-organising map analysis on the individual items would be advantageous in generating a more granular view of the process of emergence and could be considered for future research. In researching emergence, this principle can be fruitfully applied to either nomothetic or idiographic orientated research. In this research, the quantitative strand had a nomothetic orientation: a self-organising map analysis was applied to rating data collected using an established assessment instrument. An alternate idiographic approach could be used in which dimensions relating to the specific organisational context are elicited, rated and then analysed using self-organising maps. Researchers or practitioners using this approach should ensure that assessments are holistic, covering all integral quadrants.

The use of self-organising maps in this study, however, provided a view of emergence in each organisation, and illuminated the composition and relative dominance of a range of interest groups amongst agents in the system. Importantly, these interest groups were identified holistically using an integrally-informed assessment. In this way, the use of the self-organising map analysis in this study contributes to practice by providing a way in which the organisation as complex adaptive system can be assessed to support sustainability initiatives.

7.3.4 Generalisation

Since the study is based on two case studies, one being an embedded study, the findings should not be generalised. The findings are likely to have most applicability in financial services organisations in Namibia and Botswana. The findings - and in particular the emergent corporate sustainability framework - can be used to structure research and help formulate guidelines for corporate sustainability practice that seek to encourage self-organisation and emergence. Further research is needed to generalise the findings beyond the cases in which they were studied.

Whilst statistical generalisation is not possible in case study research, analytic generalisation can be usefully applied to advance existing theoretical concepts or identify new concepts based on the findings (Eisenhardt, 1989; Yin, 2014). The findings support a complexity approach across both cases, and extend the application of the integral quadrants model (Wilber, 2001) to enact emergence through coherence across multiple levels of the system. This supports and extends applications of integral theory into corporate sustainability (Edwards, 2010).

The emergent corporate sustainability framework is useful in addressing situations in which organisations are grappling with the complexity associated with sustainability transitions by illustrating how self-organised emergent approaches can be supported. Decentralised and self-organised approaches have advantages in addressing situations in which complexity makes hierarchical and linear approaches to change insufficient.

7.4 Recommendations for future research

There are several implications of this study for future research. Whilst this research sought to address the knowledge gap of understanding how the shift to corporate sustainability occurs (Valente, 2012), the complexity and extent of this transition leaves many stones unturned.

Since many of the challenges pertaining to corporate sustainability cross organisational boundaries to include supply chains and stakeholders, a similar study could be conducted which includes a wider range of stakeholders in the sample. Using a self-organising map analysis, this could allow for comparison with a broader group of stakeholders, enhancing our understanding of how axiological coalitions develop across organisational boundaries.

A further extension of the research that could be useful is to examine the applicability of the emergent corporate sustainability framework across a wider range of industries to test the generalisability of the framework. It could also be useful to explore the emergence of corporate sustainability in organisations with different levels of maturity of corporate sustainability. The study could formally assess the level of maturity of sustainability and then compare how the emergent corporate sustainability framework showed up at different levels of maturity.

Since coherence can be conceptualised at multiple levels of the system, as was discussed in chapter 2, it could be useful to study the coherence of agents at a physiological level. Heart-rate variability has been shown to be a measure of coherence (McCraty, 2010). Biofeedback devices could be used to assess this and then to determine whether enhanced coherence at this level increases the ability to enact the modes identified in the emergent corporate sustainability framework. Experience sampling techniques (Csikszentmihalyi, 1990; Fullagar & Kelloway, 2009) could also be used to study how the modes are enacted. This would provide a granular view of the emergence of corporate sustainability.

Another useful avenue is to explore the semiotic developmental domain at a more granular level. This could be done by applying the repertory grid technique (Fransella, Bell, & Bannister, 2004), analysed using self-organising maps. This would give insight into the relationship between the semiotic and axiological domains. An alternative would be to employ a qualitative construct elicitation technique such as self-characterisation (Crittenden & Ashkar, 2012) or the experience cycle methodology (Oades & Viney, 2012). This would provide a process view of the emergence of semiotic development. A further opportunity is to apply these methods to

compare the enaction of sustainability by agents externally and internally in the organisation. This could offer a more holistic view of how sustainability emerges at the level of agent.

7.5 Recommendations for practice

Corporate sustainability represents a fundamental change in the functioning of an organisation towards co-evolutionary self-organisation. As a co-evolutionary process in emergent spacetime, it is dynamic in nature. This raises key challenges for practitioners seeking to design and implement corporate sustainability initiatives. An initial implication of an emergent view on corporate sustainability is that these initiatives are necessarily holistic in nature. Since corporate sustainability is a fundamental change in system functioning, it requires concurrent development of interior and exterior domains; the practitioner should seek to cultivate corporate sustainability by responding to emergence in the system.

Emergence is a process of retroactive interaction between order, disorder and organisation (Morin, 2008). The process of co-evolution therefore must involve all of these elements. We can expect zones of coherence to emerge and dissipate. Facilitative modalities that support co-evolutionary self-organisation are important since the actors operate using semantic intentionality. However, this demands coherence between the development of the part and the whole. It can be supported by a focus on diversity and inclusion to enable diverse opinion groups to engage in dialogue.

Since sustainability is complex, having many facets (ontologically plural) and often difficult to grasp (epistemologically distant) (Esbjörn-Hargens, 2010), efforts must be made to ensure sufficient and relevant data (extended epistemological range) are available and sufficiently integrated (epistemological network density). For sustainability (co-evolutionary self-organisation) to emerge, agents need access to relevant and timely feedback (epistemological contact), and for sustainability activities to be personally meaningful (semiotic intent). It is thus crucial that managers and sustainability practitioners work holistically, rather than focusing on implementing sustainability interventions.

Positioning axiological signification (sustainability and values-based messaging) as an embedded dimension reframes concepts such as “greenwashing” as a starting point and incomplete application of corporate sustainability, and also points to risks associated with the

practice that go beyond labelling the business as unethical. Using the emergent corporate sustainability framework, greenwashing can be seen as axiological signification that is externally directed without the necessary co-evolutionary self-organisation needed to create co-evolutionary value. The risk of this approach is that agents buy into the “empty” messaging and are lulled into a false sense of security, over-rating the sustainability performance of the business, which potentially inhibits further sustainability initiatives.

Considering corporate sustainability from the semiotic development domain, our perspective broadens to focus on every agent in the system as a sustainability activist acting with semiotic intent. Supporting agents to take an interest in emergent sustainability issues in the containing systems results in semiotic symbiosis. Their perspectives are enriched through semiotic refraction as the agents take action, and as this becomes embodied the intentions and expectations of the agents evolve. To achieve this, managers can engage with direct reports to link their roles with sustainability outcomes or even more broadly with the sustainable development goals. Assisting employees to reflect on the relevance of sustainability outcomes to their personal lives is important to encourage an active response. However, this should be coupled with the measurement of sustainability-related objectives using performance management and other relevant systems. The point is not to rely on either the subjective meaningfulness and values orientation or objective measures, but to use both.

Another consideration for practitioners is to use modalities such as coaching to encourage sustainability-related initiative (self-organisation). The extent of the transition to a more sustainable future, however, will demand a complexity-orientated approach. This means that coaching methodologies require the ability to work with the semiotic structures of the agent in dialogue with stakeholders. Coaching approaches that have clear frameworks for working with how meaning is constructed are advantageous. Furthermore, coaches must guard against thinking that working with individuals on individually-orientated coaching interventions will be sufficient. Since the emergent corporate sustainability framework works across multiple levels of system, coaches might increasingly need to work across stakeholder networks that cross functional and even organisational boundaries.

Coaches will be challenged with competing agendas, uncertainty and complexity. They will need frameworks through which dimensions of meaning can be made explicit and mapped across stakeholder networks. Coaches would be advised to combine insights from complexity

theory (Cavanagh, 2006, 2013) and integral coaching (Hunt, 2009), with comprehensive theories that work with the construction of meaning such as personal construct coaching (Stojnov & Pavlovic, 2010), which draws on personal construct psychology (Kelly, 1991), with an emphasis on adapting systemic readings of the theory (Procter, 2014) for application to business (Brophy, 2007). This will allow for the coaching approach to holistically consider the persons, groups or teams being coached in the context of the systems in which they operate, whilst the construction of meaning associated with the ongoing emergent process may be made explicit.

Coaches can also benefit from applying some of the research strategies already discussed to grasp emergence. Self-organising maps are useful in this regard when combined with either idiographic or nomothetic instruments. Idiographic measures such as the repertory grid technique (Fransella et al., 2004) can be applied to individuals to support semiotic development and to stakeholder groups to negotiate axiological development (van de Kerkhof, Cuppen, & Hisschemöller, 2009). This provides the opportunity for agents to identify the dimensions used to visually represent the emergence. There is potential value, as was suggested in the previous section, in exploring the application of self-organising maps to analyse the repertory grid data when applied across stakeholder networks. Nomothetic instruments can also be useful, but coaches would be advised to apply holistic measures which consider all integral quadrants and to use analysis techniques such as self-organising maps that enable the visualisation of emergence.

The emergent corporate sustainability framework offers managers, coaches and sustainability practitioners a thinking tool, a means whereby the transition towards corporate sustainability can be more holistically grasped. Working with this tool requires awareness that all models reduce reality (Morin, 2006, 2008), and as such, it would be wise to involve stakeholder networks broadly in conversations about sustainability, bearing in mind that this does not necessarily protect against an anthropocentric bias in thinking. The intentional use of a co-constructivist epistemology (Morin, 2008) would be useful to help the manager, coach or sustainability practitioner to pay attention to complexity in the system. This demands a certain humility from leaders and coaches - no one can hold a privileged view with a full view of the system. Rather, it is likely that all stakeholder views will be partially true, requiring engagement and collaboration to identify and implement sustainability initiatives.

Furthermore, the findings show the importance of implementing sustainability in a decentralised manner - subsidiaries made progress towards sustainability objectives by adapting to local constraints. So whilst it is important for the business to link strategic frameworks to sustainable development goals and the principles of responsible banking - which had only been released in draft at the time of writing (UNEP Finance Initiative, 2018) - it is also important to create a context which enables self-organisation at a local level. A de-centralised approach requires flexibility within an overall framework to ensure there is sufficient scope for initiative at a local level whilst providing sufficient coordination. Strategic frameworks and incentive structures should be designed to encourage initiative at a local level, with concurrent development of expertise and effective knowledge management.

Finally, every effort should be made to focus on making sustainability meaningful within a compelling organisational purpose. Achieving this will involve transforming the entire business, rather than approaching it in a piecemeal fashion. This will allow for zones of coherence to form in which co-evolutionary self-organisation emerges. An important part of this is to help agents grasp the impact of their work in sustainability, which requires sufficient epistemological contact and effective feedback loops resulting in semiotic refraction. Ultimately, the task of the sustainability practitioner, manager and coach will be to sustain hope whilst awakening agents to the gravity of the challenges that lie ahead.

7.6 Researcher's reflection

Writing this dissertation whilst Cape Town was experiencing the worse drought in the history of the city, narrowly avoiding "day zero" and in the process setting a new benchmark for water conservation in a major metropole, left the researcher with both an optimistic view of how co-evolutionary processes can rapidly emerge and an experience of how devastating the effects of climate change are for humanity and all the inhabitants of our planet. Living through the drought heightened the researcher's awareness of the importance of sustainability having an ontological basis. If it is conceptualised within a narrow, specialised focus of behavioural and system change, it is unlikely to be sufficient, as the change required is a complete transformation of the relationship between humanity, fellow species and our containing system. The researcher is struck by the vast complexity which far exceeds our ability to understand, let alone predict and control, outcomes. Just maybe, with all of our collective effort, humanity will

emerge through this precarious situation and use the crisis as an opportunity to evolve and fundamentally change our way of life.

7.7 Conclusion

> "Indeed, we find ourselves here on the very path taken by Einstein of adapting our modes of perception borrowed from the sensations to the gradually deepening knowledge of the laws of Nature" (Bohr, 1928, p. 590).

The transition to a more sustainable future is, simultaneously, a challenge to get back onto a co-evolutionary path and a challenge to shift our understanding of nature at the most fundamental level. Grasping and embodying a complexity ontology are fundamental to this transition and offer the possibility of escaping the consequences of a long history of reductionist thinking.

This chapter articulated the contribution of this study, which positioned corporate sustainability as an emergent co-evolutionary process. Dimensions that describe the level of coherence between the company and containing system were identified in the research. The dimensions - axiological signification, semiotic symbiosis, co-evolutionary value and epistemological range - cover all integral quadrants and form the basis for how corporate sustainability is embedded. Dimensions that describe the level of coherence between the agents and company were identified in the study. These dimensions, namely axiological resonance, semiotic intention, co-evolutionary practice and epistemological network density, extend across all integral quadrants, forming the basis for how corporate sustainability is embodied.

Together these dimensions form zones of coherence, which result in the emergence of four conditions. The conditions - axiological frame, semiotic intention, co-evolutionary scope and epistemological contact - cover all integral quadrants. The presence of the conditions constitutes the basis from which corporate sustainability is enacted by means of four modes. The modes, namely axiological coalitions, semiotic refraction, co-evolutionary self-organisation and epistemological extension, extend across all integral quadrants.

The chapter then discussed limitations of the study, which as a case study can only be generalised analytically to advance theory. Recommendations for research and practice were identified.

Corporate sustainability is a journey towards a fundamental redefinition of the way in which we as humans interact with each other and our containing system, towards an emergent co-evolutionary process. This requires a shift in both interior and exterior integral domains. We must guard against basing our hopes exclusively on technical solutions without carefully reconstructing the worldview that has created so many of the problems that we now face. Ultimately, sustainability or corporate sustainability at its core is a self-organised and co-evolutionary process and requires us to cultivate a sense of meaningfulness (semiotic intent) within an axiological frame that supports emergence. By reinforcing the co-evolutionary efforts of agents with feedback that allows for epistemological contact, we can together start charting a new course. The challenges ahead are immense, and we will need all hands on deck if we are to shift the trajectory of human history.

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APPENDIX A: SURVEY INFORMED CONSENT FORM

You are invited to participate in a research study exploring emergence in corporate sustainability. The research is being conducted by Roger Maitland, a doctoral student at the University of Cape Town Graduate School of Business (GSB.) This research forms part of Roger's doctoral dissertation. The research has been approved by the Commerce Faculty Ethics in Research Committee.

Your participation in the study is requested. It is important that you read and understand the information provided in this informed consent form prior to agreeing to participate in this research. Please ask the researcher for clarification if you have any questions.

Why is this research being conducted?

The purpose of the study is to better understand how organisations can address the challenges associated with corporate sustainability initiatives. The results of the research will be used to construct a framework to support corporate sustainability in financial institutions.

What will my involvement be?

You are invited to complete an online survey, which will explore your experiences of corporate sustainability within your organisation. The survey should take approximately 20 minutes to complete.

What are the risks of involvement in this study?

There are no risks to involvement in this study. You may experience some mental fatigue after completing the survey. It may be advisable to have a short break after completing the survey prior to engaging in demanding tasks.

What are the benefits of involvement in this study?

The experience of reflecting upon your experience of corporate sustainability may be useful in building awareness of how to contribute towards the transition to a sustainable future. By

being involved in the study, you are also contributing to enhancing the effectiveness of corporate sustainability methodologies. You are invited to receive a copy of the findings.

Will the information I provide be confidential?

All study records will be kept confidential. Accepting the terms contained in this consent form provides the researcher, supervising faculty and a research assistant access to see the research data. Your research data may also be requested by authorized representatives from the University of Cape Town for monitoring or auditing purposes.

All data will be stored on password-protected computers and backup drives. Audio recordings of interviews and interview data will be accessible to the researcher, faculty, supervisor and research assistant. The research assistant will sign a professional assistance confidentiality agreement.

Records that would identify you as a participant, such as informed consent forms, will be destroyed approximately 3-years after the study is finalised. Your name and the company name of your employer will not appear in the dissertation or any publications or reports.

Participation is voluntary

You are at liberty to decline to participate or to withdraw at any point from this study without prejudice. Should you withdraw, your data will be removed from the study and destroyed. The researcher is also at liberty to terminate the study at any time.

Can I get access to the results?

You may request an executive summary of the research by indicating this in the survey.

Additional Information

If you have any questions relating to your involvement in this study, please discuss these with the researcher before signing this form. You may also contact the supervising faculty member should you have any questions or concerns now or during the study. The contact details of the researcher and supervising faculty member are provided at the bottom of the form.

RESEARCHER
Roger Maitland
Graduate School of Business

RESEARCH SUPERVISOR
Prof. Walter Baets
Graduate School of Business

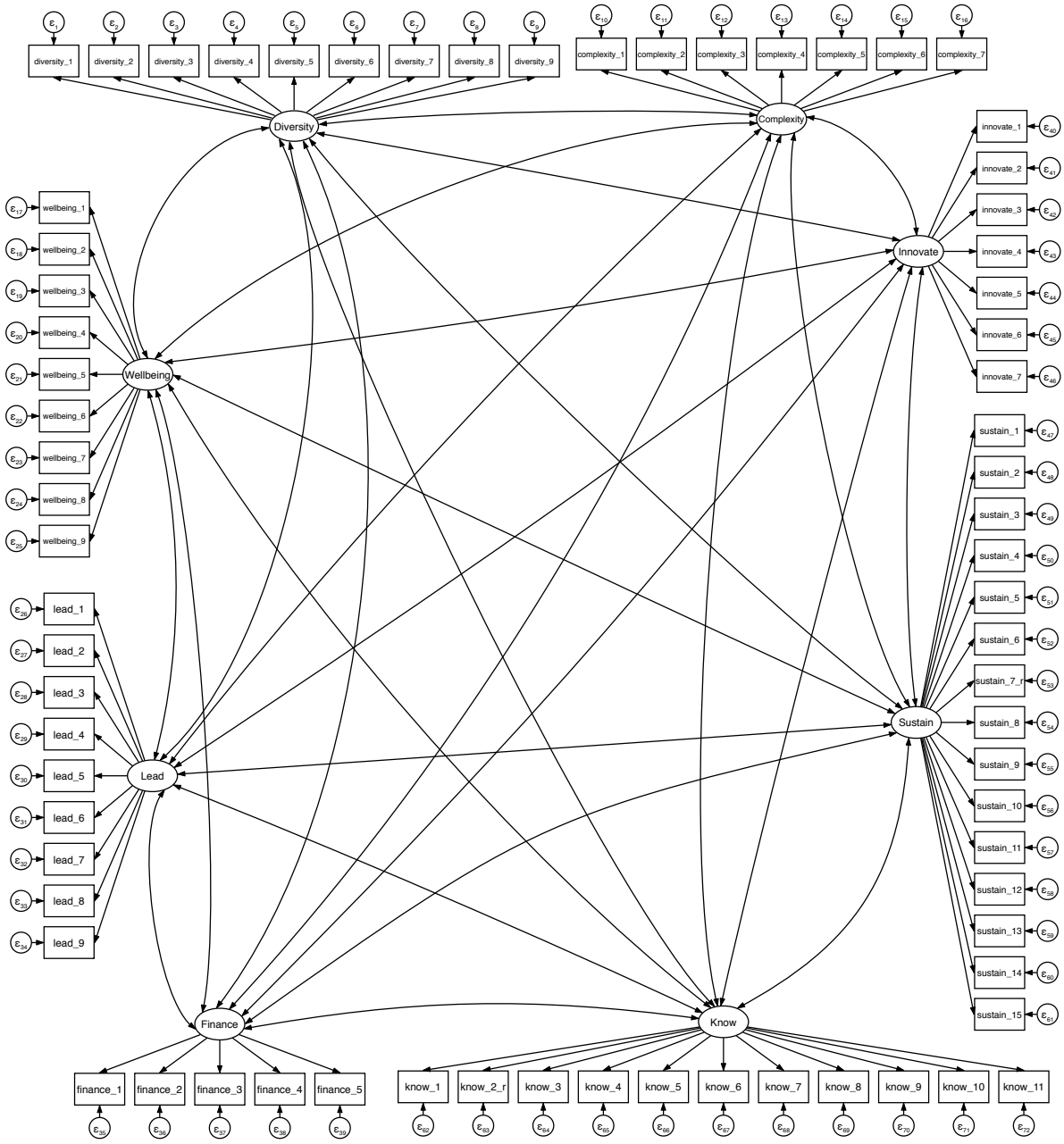
APPENDIX B: CASSANDRA SURVEY ITEMS

Values
Axis 1: Diversity
1.1. Actions, in our organisation, are based on an ethical code
1.2. Anti-discrimination policies are effectively implemented in our organisation
1.3. Our organisation maintains dialogue with all stakeholders
1.4. Our organisation assesses the work environment as the basis for ongoing improvement
1.5. Talent retention is actively supported by our organisation
1.6. Our organisation values and solicits a variety of opinions in decision-making
1.7. Internal communication is effective in our organisation
1.8. Our leaders are strongly committed to the vision and values of the organisation
1.9. We have active interest groups in this organisation whose recommendations are considered in management decisions
Axis 2: Complexity
2.1. Our organisation pushes boundaries and moves beyond the status quo
2.2. Our organisation discontinues outdated practices in a timely manner
2.3. Our organisation encourages diverse stakeholders to participate in decision-making forums
2.4. Our organisation deals with unpredictability in the business environment creatively
2.5. Employees are encouraged to self-organise in our organisation
2.6. Employees regularly contribute new ideas and solutions in the organisation
2.7. Employees are encouraged to take initiative in our organisation
Personal Development
Axis 3: Personal well-being
3.1. Our organisation actively supports the development of employees
3.2. Our organisation values time spent on work activities that are not immediately productive
3.3. Our organisation encourages employees to investigate underlying causes when issues arise
3.4. Our organisation actively supports a joyful work environment
3.5. I feel valued in our organisation
3.6. Managers in our organisation have real responsibility and autonomy within parameters
3.7. There is space for the realisation of my aspirations in my function
3.8. Managers are valued for taking courageous decisions in our organisation
3.9. I feel that I am contributing through my role to a larger purpose

Axis 4: Leadership and teamwork
4.1. Employees in our organisation are well trained for their roles
4.2. Leaders in our organisation are valued for being aware of their environment
4.3. Our organisation has dynamic networks of communication
4.4. The purpose of the organisation is clear to employees
4.5. Leaders in our organisation make space for employees to contribute rather than controlling them
4.6. Our leaders focus more on projecting a vision than correcting what happened in the past
4.7. Leaders in our organisation are open to being challenged
4.8. Communication is clear in our organisation
4.9. We have a meaningful external focus in our organisation
Mechanistic Performance
Axis 5: Financial performance
5.1. The profit margin in our organisation is above average in our industry
5.2. The return on capital employed is above average in our industry
5.3. Our liquidity position is above average in our industry
5.4. Our organisation generates enough cash flow to self-fund our activities and growth
5.5. The cash flow in our organisation is above average in our industry
Axis 6: Innovative potential
6.1. Our organisation has a distinct process for developing new ideas
6.2. We are able to identify creative solutions on demand in our organisation
6.3. Idea generation is regarded as a key business practice in our organisation
6.4. I regularly develop new ideas for our organisation
6.5. The leadership of our organisation encourages innovative thinking
6.6. Our organisation has a structured process for refining new ideas
6.7. The refinement of new ideas is valued in our organisational culture
Holistic Performance
Axis 7: Sustainable development and social responsibility
7.1. Our organisation balances social, economic and environmental concerns
7.2. Our organisations goes beyond legal compliance in addressing sustainability
7.3. Our organisation values sustainability as a way of developing the organisation
7.4. Our organisation values sustainability as a way of developing its supply chain
7.5. Our organisation actively supports community development
7.6. There is a good fit between our organisation and the social initiatives it supports
7.7. When our organisation support different social initiatives, our organisation benefits more than the cause
7.8. It's important to me that our organisation supports social initiatives

7.9. Responsibility is valued by our organisation
7.10. Our organisation values integrity
7.11. Our organisation values humility
7.12. Our organisation encourages employees to be aware of their impact on others
7.13. Authentic communication is valued by our organisation
7.14. Our organisation values constructive negotiation
7.15. Our organisation values effective coordination of activities
Axis 8: Knowledge and learning
8.1. Projects in our organisation are measured using both financial and non-financial measures
8.2. The rigidity of processes in our organisation gives people very little possibility for correction
8.3. Our organisation encourages harmony between people
8.4. Confidence and control are seen in our organisation as both contrary but necessary
8.5. Managers in our organisation are encouraged to exchange ideas
8.6. Our organisation builds the confidence of its employees
8.7. Decisions in our organisation are informed by evidence
8.8. There is a culture of learning in our organisation
8.9. The working environment at our organisation is well organised
8.10. There are sufficient opportunities for me to interact with colleagues across the organisation
8.11. Issues between members of groups are effectively addressed in our organisation

APPENDIX C: CASSANDRA PATH MODEL



APPENDIX D: QUALITATIVE SAMPLING CRITERIA

The following sampling criteria were implemented in consultation with the research sponsor and key stakeholders from each organisation to identify an initial sample for each entity.

Respondents that cover the spectrum of positions and perspectives in relation to sustainability at the company.

- Have both extreme and typical cases been considered?
- Are stakeholders who have been or will be important to the successful design and implementation of sustainability at the company been included?
- Are the respondents knowledgeable about sustainability in the company?
- Do we have a diversity of functional areas, age groups and levels of seniority represented?

APPENDIX E: INTERVIEW INFORMED CONSENT FORM

You are invited to participate in a research study exploring emergence in corporate sustainability. The research is being conducted by Roger Maitland, a doctoral student at the University of Cape Town Graduate School of Business (GSB). This research forms part of Roger's doctoral dissertation. The research has been approved by the Commerce Faculty Ethics in Research Committee.

Your participation in the study is requested. It is important that you read and understand the information provided in this informed consent form prior to agreeing to participate in this research. Please ask the researcher for clarification if you have any questions.

Why is this research being conducted?

The purpose of the study is to better understand how organisations can address the challenges associated with corporate sustainability initiatives. The results of the research will be used to construct a framework to support corporate sustainability in financial institutions.

What will my involvement be?

You will be required to participate in a 60-minute interview to explore your perceptions and experience of the journey towards sustainability at [the organisation]. The interview will be conducted telephonically or over Zoom, a web conferencing application.

What are the risks of involvement in this study?

There are no risks to involvement in this study. You may experience some mental fatigue after completing the interview. It may be advisable to have a short break after the interview, prior to engaging in demanding tasks.

What are the benefits of involvement in this study?

The experience of reflecting upon your experience of corporate sustainability may be useful in building awareness of how to contribute towards the transition to a sustainable future. By being involved in the study, you are also contributing to enhancing the effectiveness of corporate sustainability methodologies. You are also invited to receive a copy of the findings.

Will the information I provide be confidential?

All records will be kept confidential. Signing this consent form provides the researcher, supervising faculty and a research assistant access to see the research data. Your research data may also be requested by authorized representatives from the University of Cape Town for monitoring or auditing purposes.

All data will be stored on password-protected computers and backup drives. Audio recordings of interviews and interview data will be accessible to the researcher, faculty supervisor and research assistant. The research assistant will sign a professional assistance confidentiality agreement. Records that would identify you as a participant, such as informed consent forms, will be destroyed approximately 3-years after the study is finalised. Your name and the company name of your employer will not appear in the report.

Participation is voluntary

You are at liberty to decline to participate or to withdraw at any point from this study without prejudice. Should you withdraw, your data will be removed from the study and destroyed. The researcher is also at liberty to terminate the study at any time.

Compensation

There is no monetary compensation for participation in this research.

Can I get access to the results?

You may request a summary report of the aggregated final results by checking the box at the end of the form.

Additional Information

If you have any questions relating to your involvement in this study, please discuss these with the researcher before signing this form. You may also contact the supervising faculty member should you have any questions or concerns now or during the study. The contact details of the researcher and supervising faculty member are provided at the bottom of the form.

I have read the above informed consent form and have had the opportunity to ask questions about this study. My rights as a research participant have been explained, and I voluntarily consent to participate in this study. By signing this form, I agree to participate in this research study.

☐ I would be like to receive a copy of the summative findings of this study

_____ NAME OF PARTICIPANT (please print)

_____ SIGNATURE OF PARTICIPANT

_____ EMAIL ADDRESS OF PARTICIPANT

_____ TELEPHONE NUMBER OF PARTICIPANT

_____ DATE

RESEARCHER
Roger Maitland
Graduate School of Business

RESEARCH SUPERVISOR
Prof. Walter Baets
Graduate School of Business

APPENDIX F: INTERVIEW PROTOCOL

Initiation (5 mins)

Thank you for you for making the time to meet with me and participate in this research project. My name is Roger Maitland, and I am a PhD student at the University of Cape Town Graduate School of Business. This research focuses on emergence in corporate sustainability at financial institutions. Sustainability in this study is defined as development which meets the needs of the present generation without compromising the ability of future generations to meet their needs. For a business, this means focusing on people, planet and profit. You have been identified to participate in the research because you are considered to be an important stakeholder in the company's sustainability initiatives.

I confirm that your privacy will be protected at all times as outlined in the informed consent form. All information obtained will be treated strictly anonymously. Your name and the company name will not appear in any final report. Participation in the study is voluntary. You are free to withdraw at any stage of the interviewee without stating any reason. You will in no way be disadvantaged if you want to withdraw.

I would like to please request your permission to record this session.

Start recording

- To get us started, please give me a brief background on your career.

The interview will have two parts. In the first part I will ask you to relate the story of your experience of sustainability at the company. In the second part, I will invite your reflections on the outcome of the sustainability survey conducted recently in the business.

Main narration (15 mins)

- What do you understand by sustainability in a business context?
- Tell me about [the organisation's] journey to sustainability thus far, from the initial steps to the point where the business now positions itself as [brand positioning]

Interviewer only uses non-verbal signals, attentive listening and encouragement to continue the narrative, e.g. what happened next?

Prompts: (only if necessary)

- When did you first become aware of sustainability initiatives in the business?
- What are you proud of that the business has achieved so far in the transition to sustainability?
- What worries you the most about the transition towards sustainability in the business?

Coda

- Is there anything else you want to add?

Questioning phase (10 mins)

- Ask immanent questions developed during the main narration, guided by integral quadrants

Reflection on clusters (30 mins)

Please refer to the document I emailed to you for this next section of the interview. This is the output of a sustainability survey that was conducted in the company last year.

1. How, if at all, do these clusters help to explain the emergence[16] sustainability at [the company]?

2. How, if at all, do these clusters help to explain issues that have inhibited the emergence of sustainability at [the company]?

3. How, if at all, have the similar views between the various clusters (marked with ellipses) supported the emergence of sustainability at [the company]?

4. What, in your view, is needed for progress to be made towards sustainability at [the company]?

5. So these were my questions, is there anything that you would care to add?

Use probing questions (e.g. why is that important to you?) to explore perceptions.

[16] When emergence was not understood, it was re-phrased as 'progress towards sustainability'.

APPENDIX G: RESEARCH JOURNAL EXTRACTS

ONTOLOGICAL REFLECTION

What happened in the research?
When working with the interpretation of the results of the self-organising maps, I noticed myself trying to determine which cluster held the 'correct' view of the organisation. In reflecting on this, I realised that this view was at odds with my ontological position.
What was my experience of this?
This interpretation is contrary to a pluralist ontological position, in which all perspectives are more usefully viewed as 'true but partial', as part of a co-evolutionary process of emergence.
How can I see it differently?
By redirecting my attention towards the interaction between agents and clusters of agents, I can gain insight by considering the implications of this interaction for the emergence of corporate sustainability in the cases.
What can I do about it?
I started a deliberate practice to apply complexity thinking not only to the research process but to other aspects of my work and life, whilst journaling to ensure regular reflection on practice. This is helping to make explicit habitual assumptions in my thinking.

SAMPLING REFLECTION

What happened in the research?
Sampling for the qualitative strand of the research is proving challenging in Case A due to the number of entities in the group and only having a sponsor at group level. Effective implementation the maximum variation sampling requires collaboration with internal stakeholders.
What was my experience of this?
I am concerned that if I continue without modifying the sampling approach I will end up with a convenience sample rather than achieving a maximum variation sample.
How can I see it differently?
By engaging with key stakeholders at entity and group level, I reduce the bias through combining multiple perspectives. Multiple perspectives allow for more informed application of the sampling criteria.
What can I do about it?
In addition to engaging multiple stakeholders across the various entities, I implemented snowball sampling as a secondary step, whereby the informants are asked at the end of the interview to identify additional informants. This is working well as the informants have a clear understanding of the research by the end of the interview which enhances their ability to make sampling recommendations.

INTERVIEW REFLECTION

What happened in the research?
Whilst the interviews are generally going very well, triggering a narrative has been difficult in some interviews. There are differing levels of exposure to and interest in corporate sustainability. I am also finding some interviewees are struggling with the navigating the company dashboard data.
What was my experience of this?
I notice that when this happens, I feel frustrated and become self-critical about my performance as interviewer.
How can I see it differently?
Whilst this could be an indication of issues with the interview protocol or process, it could also be an indication of epistemological distance. Rather than becoming overly self-critical I can explore the perceived epistemological distance which would likely be useful in the data analysis.
What can I do about it?
There are several ways in which I addressed these issues. I started to trigger the main narrative by picking up on key contextual cues provided in the initial question and linked these to the process of triggering the narrative. If the narrative is short and summarised, I can attempt to trigger another narrative during the remainder of the interview. To address issues with assimilating data in the company dashboards I have started walking each interviewee step-by-step through the data set.

NARRATIVE ANALYSIS REFLECTION

What happened in the research?
In attempting to implement the narrative trajectories during the data analysis I became aware of my thinking process moving back to a linear approach to change as opposed to seeking to understand emergence as a process.
What was my experience of this?
I identified this as an underlying thought form of reducing the data to a linear sequence of steps that were followed in each case that be replicated in other firms seeking to implement corporate sustainability.
How can I see it differently?
Emergence is “the arising of novel and coherent structures, patterns and properties during the process of self-organisation in complex systems” (Goldstein, 1999, p. 49), where the steps of the process cannot always be traced (Lewes, 1875), requiring investigation at the scale of the system not the analysis of the part (Wells, 2013).
What can I do about it?
Applying the Hermeneutic circle principle in the data analysis provides a means whereby local interactions can be considered within a broader holistic view. Reconstructing the narrative thus becomes an example of how the enacted corporate sustainability framework unfolded in a particular setting, rather than seeking a temporal process that can be generalised. This is opening up new possibilities in the data analysis.